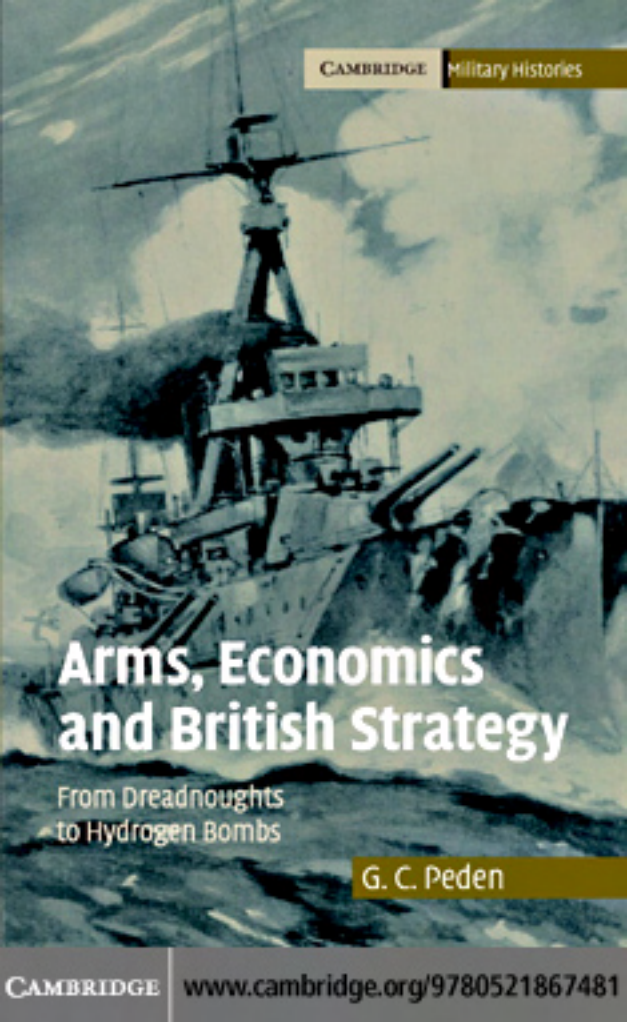


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Arms, Economics and British Strategy

From Dreadnoughts
to Hydrogen Bombs

G. C. Peden

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Arms, Economics and British Strategy

This book integrates strategy, technology and economics and presents a new way of looking at twentieth-century military history and Britain's decline as a great power. G.C. Peden explores how, from the Edwardian era to the 1960s, warfare was transformed by a series of innovations, including dreadnoughts, submarines, aircraft, tanks, radar, nuclear weapons and guided missiles. He shows that the cost of these new weapons tended to rise more quickly than national income and argues that strategy had to be adapted to take account of both the increased potency of new weapons and the economy's diminishing ability to sustain armed forces of a given size. Prior to the development of nuclear weapons, British strategy was based on an ability to wear down an enemy through blockade, attrition (in the First World War) and strategic bombing (in the Second), and therefore power rested as much on economic strength as on armaments.

G. C. PEDEN is Professor of History at the University of Stirling. His publications include *British Rearmament and the Treasury, 1932–1939* (1979), and *The Treasury and British Public Policy, 1906–1959* (2000).

Cambridge Military Histories

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Arms, Economics and British Strategy

From Dreadnoughts to Hydrogen Bombs

G. C. Peden



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Abbreviations

TEXT

BAC	British Aircraft Corporation
BAOR	British Army of the Rhine
BEA	British European Airways
BEF	British Expeditionary Force
BOAC	British Overseas Airways Corporation
CAS	Chief of Air Staff
CDS	Chief of the Defence Staff
CENTO	Central Treaty Organisation
CID	Committee of Imperial Defence
CIGS	Chief of the Imperial General Staff
CND	Campaign for Nuclear Disarmament
DEA	Department of Economic Affairs
DMO	Director of Military Operations
DRC	Defence Requirements Sub-Committee
EPT	excess profits tax
FAA	Fleet Air Arm
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GNP	gross national product
h.p.	horse-power
ICBM	intercontinental ballistic missile
IMF	International Monetary Fund
IRBM	intermediate-range ballistic missile
MP	member of Parliament
m.p.h.	miles per hour
NATO	North Atlantic Treaty Organisation
NDC	national defence contribution
NEDC	National Economic Development Council
NNP	net national product
OEEC	Organisation for European Economic Co-operation

OR	operational requirement
RAF	Royal Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
RTC	Royal Tank Corps
SACEUR	Supreme Allied Commander Europe
SAM	surface-to-air missile
SEATO	South-East Asia Treaty Organisation
SOE	Special Operations Executive
UCS	Upper Clyde Shipbuilders
UK	United Kingdom
US	United States
USAAF	United States Army Air Force
USAF	United States Air Force
USSR	Union of the Soviet Socialist Republics
VTOL	vertical take off and landing
WEU	Western European Union

REFERENCES

ADM	Admiralty records
AIR	Air Ministry records
AVIA	Ministry of Supply records
c. or cc.	column(s)
C	Cabinet paper
CAB	Cabinet Office records
Cd, Cmd, Cmnd	Command papers
CHT	Lord Chatfield papers
CID	Committee of Imperial Defence
CLRK	Sir Richard Clarke papers
COS	Chiefs of Staff Committee paper
CP	Cabinet paper
D	Defence Committee paper
<i>DBFP</i>	<i>Documents on British Foreign Policy</i>
<i>DBPO</i>	<i>Documents on British Policy Overseas</i>
DC	Defence Committee paper
DCM	Ministerial Committee on Disarmament paper
DCOS	Deputy Chiefs of Staff paper
DEFE	Ministry of Defence records
DO	Defence and Overseas Policy Committee paper
DP(P)	Defence Plans (Policy) Committee paper

DPR	Defence Policy and Requirements Committee paper
DPR(DR)C	Defence Policy and Requirements (Defence Requirements) Committee
DRC	Defence Requirements Sub-Committee
DSND	Duncan Sandys papers
FISR	Fisher of Kilverstone papers
FO	Foreign Office records
HC Deb.	<i>House of Commons Debates</i> (preceded by volume number)
HMSO	Her Majesty's Stationary Office
LG	David Lloyd George papers
MB	Mountbatten papers
MC	Military Committee (NATO) paper
NC	Neville Chamberlain papers
n.d.	no date
NLS	National Library of Scotland
OPD	Defence and Overseas Policy Committee paper
PP	<i>Parliamentary Papers</i>
PREM	Prime Minister's Office records
s	series
T	Treasury records
TNA	The National Archives of the United Kingdom: Public Record Office
UK	United Kingdom
WO	War Office records

Introduction

The starting point for this study of British defence policy between 1904 and 1969 is the tendency for the costs of new weapons systems to rise more rapidly than the national income.¹ Three main insights are offered. First, British defence policy was based upon technological innovation. Second, reductions in the size of the armed forces to accommodate new weapons systems in defence budgets were not evidence of a decline in power. Third, British grand strategy, incorporating economic as well as military responses to external threats, was much more ambitious than is commonly believed.

I first approached the relationship between economics and strategy in my book *British Rearmament and the Treasury, 1932–1939*, which showed that Treasury attempts to influence strategy reflected concern about Britain's ability to sustain a long war, and were related to trade and industry as well as money.² Since then there have been a number of case studies of interaction between economics and strategy. For example, David French and Avner Offer have described how British strategic planning before 1914 assumed that naval blockade would cause the German economy to collapse, while Britain's access to raw materials and her industrial power would enable her to supply continental allies with munitions.³ David Edgerton has challenged assumptions about British military backwardness by putting forward a broad-arching thesis of Britain as a pioneer of technologically focused war, possessed of a powerful military-industrial-scientific complex that emerged in the first decades of the twentieth century and was cut back only in the late 1950s

¹ See Philip Pugh, *The Cost of Seapower: The Influence of Money on Naval Affairs from 1815 to the Present Day* (London: Conway Maritime Press, 1986).

² G. C. Peden, *British Rearmament and the Treasury, 1932–1939* (Edinburgh: Scottish Academic Press, 1979).

³ David French, *British Economic and Strategic Planning 1905–1915* (London: Allen and Unwin, 1982); Avner Offer, *The First World War: An Agrarian Interpretation* (Oxford: Clarendon Press, 1989).

and the 1960s.⁴ The time seems ripe for an interdisciplinary study of the interaction between technology, economics and strategy over a similar period.

This book addresses three major questions that confront every government: how to compete internationally in military technology; what proportion of national income to devote to defence; and how best to deploy the armed forces. British governments had to relate defence policy to a world role that reflected economic and strategic interests acquired when Britain had been the leading industrial nation, but which was increasingly difficult to maintain as other countries caught up with or overtook the British economy. The idea that there is a relationship between a nation's economic fortunes and its importance as a military power is a familiar one, thanks to Paul Kennedy's *Rise and Fall of the Great Powers*. Kennedy emphasised that the historical record only supports this thesis in the long run. Far from being a proponent of economic determinism, he showed that some powers chose not to use economic power to build up armed forces. For example, the United States preferred in the inter-war period to withdraw into isolationism. Likewise, when Britain experienced economic decline relative to other powers, politicians had some degree of choice in grand strategy. He noted the importance of ability to afford increasingly expensive weapons systems, but saw the main dynamic of change as technology that increased the output of an economy and altered its relative size compared with other economies.⁵ In contrast, this book focuses on the related, but distinct, dynamic of changes in military technology.

Both economic decline and military technology feature in Correlli Barnett's four-volume account of the 'collapse' of British power between the First World War and the Suez crisis of 1956.⁶ Barnett used a concept of total strategy which encompassed all factors that he believed to be relevant to a nation's ability to preserve or extend its power: education, literature, religion and national myths, for example, as well as armed forces and economic and technological resources. His work may

⁴ David Edgerton, *England and the Aeroplane: An Essay on a Militant and Technological Nation* (Basingstoke: Macmillan, 1991); 'Liberal militarism and the British state', *New Left Review*, 185 (1991), 138–69; *Warfare State: Britain, 1920–1970* (Cambridge University Press, 2006).

⁵ Paul Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000* (London: Unwin Hyman, 1988).

⁶ Correlli Barnett, *The Collapse of British Power* (London: Eyre Methuen, 1972); *The Audit of War: The Illusion and Reality of Britain as a Great Nation* (London: Macmillan, 1986); *The Lost Victory: British Dreams, British Realities 1945–1950* (London: Macmillan, 1995); *The Verdict of Peace: Britain between her Yesterday and the Future* (London: Macmillan, 2001).

be seen as the combination of two Anglo-American historiographical traditions. The first attempts to explain Britain's relative decline as an industrial economy by asserting that economic performance was undermined by anti-industrial and anti-scientific biases in British culture, broadly defined. The second attributes relative military decline to shortcomings in the doctrine and equipment of the British armed forces, and technical backwardness in the industries supplying them, all usually judged by comparison with an idealised Germany, if not perfection. In fact the British elite was very interested in exploiting science and technology for military purposes and, as Edgerton has pointed out, the British aircraft industry was more efficient than its German counterpart for most of the Second World War.⁷

Power has to be related not only to resources but also to commitments. Barnett argued that the British Empire, far from being an asset, was a political and military liability that policymakers failed to tackle with clear-sighted, strategic calculation.⁸ Sir Michael Howard, in his seminal work, *The Continental Commitment*, stated more cautiously that his thesis that the Empire brought Britain no strength in her dealings with Germany in the 1930s was intended to be a starting point for further discussion.⁹ Colonies and dominions that together covered about a fifth of the world's land mass at the beginning of the twentieth century, a proportion raised to about a quarter as a result of mandates acquired after the First World War, would certainly seem to have represented strategic overextension in terms of Britain's own resources. However, as I have argued elsewhere, the Empire represented assets in the form of naval bases, control of access to raw materials, and reserves of manpower, and did not in fact divert very significant defence resources overseas in the 1930s.¹⁰ Phillips O'Brien has shown that the Royal Navy was so concentrated in European waters in the years immediately before 1914 that it would not have been much smaller even

⁷ David Edgerton, 'The prophet militant and industrial: the peculiarities of Correlli Barnett', *Twentieth Century British History*, 2 (1991), 360–79. The contributors to Bruce Collins and Keith Robbins (eds.), *British Culture and Economic Decline* (London: Weidenfeld and Nicolson, 1990), deal critically with Barnett's thesis and also the work of Martin J. Wiener, *English Culture and the Decline of the Industrial Spirit 1850–1980* (Cambridge University Press, 1981), pointing out that cultural differences between Britain and Germany were less significant than is often supposed.

⁸ Barnett, *Collapse of British Power*, pp. 74–83, 123–4, 133–40, 163–233; *Lost Victory*, pp. 51–69; *Verdict of Peace*, pp. 146–50, 487.

⁹ Michael Howard, *The Continental Commitment: The Dilemma of British Defence Policy in the Era of the Two World Wars* (London: Temple Smith, 1972), p. 7.

¹⁰ G. C. Peden, 'The burden of imperial defence and the continental commitment reconsidered', *Historical Journal*, 27 (1984), 405–23.

had there been no colonies to defend.¹¹ Orest Babij, John Ferris, Greg Kennedy and Keith Neilson have taken a very different tack from Barnett and Howard by emphasising that the defence of Britain was tied to the defence of the Empire and trade routes. From their perspective, there was a failure after 1929 to maintain the naval superiority, and the naval and air bases and army garrisons, necessary to defend Britain's world-wide interests.¹²

Arms

Assessment of Britain's technological backwardness or otherwise in armaments has to be made against a background of a series of innovations that transformed warfare. At the beginning of the twentieth century the wireless telegraph, as radio was then called, was a novelty; subsequently, electronics were applied not only to communications, but also to detecting the enemy with radar and to enabling warships, aircraft or guided missiles to find their targets. At sea Britain took a technological lead in 1906 by launching HMS *Dreadnought*, which set a new standard for ships armed with big guns. However, submarines and aircraft soon posed threats to surface warships and merchant ships, and battleships were eventually displaced by aircraft carriers. On land, the firepower of armies was greatly increased by improved artillery and machine guns, and the tank, originally designed in the First World War to support infantry in breaking through barbed wire and trenches, displaced cavalry as the mobile military arm from the 1930s. The development of air power ended Britain's insular security as early as the First World War, and in the 1950s Britain came to be regarded as indefensible against a nuclear attack. From the foundation of the Royal Air Force (RAF) in 1918 to the 1960s the strategic bomber was the principal justification for the existence of a service independent of the navy and army, but in 1969 the British nuclear deterrent was transferred from Bomber Command to submarine-launched Polaris missiles. The transfer was significant not only as regards

¹¹ P. P. O'Brien, 'The titan refreshed: imperial overstretch and the British navy before the First World War', *Past and Present*, 172 (2001), 145–69.

¹² John Ferris, "'The greatest power on earth': Great Britain in the 1920s', *International History Review*, 13 (1991), 726–50; John Ferris, "'It is our business in the Navy to command the seas': the last decade of British maritime supremacy, 1919–1929' and Orest Babij, 'The Royal Navy and the defence of the British Empire, 1928–1934', in Greg Kennedy and Keith Neilson (eds.), *Far Flung Lines: Studies in Imperial Defence* (London: Frank Cass, 1997), pp. 171–89 and 124–70 respectively; Keith Neilson, 'The Defence Requirements Sub-Committee, British strategic foreign policy, Neville Chamberlain and the path to appeasement', *English Historical Review*, 118 (2003), 651–84.

the balance between the services but also because British-designed bombers were being replaced by an American-designed weapons system. Britain, it would seem, was no longer a technological leader.

If Britain's armed forces were to be up to, or in advance of, contemporary standards, growing investment in research and development was required to produce increasingly sophisticated equipment. There were three possible responses to growing costs: the size of the armed forces could be reduced; obsolescent equipment could be made to last longer; or the proportion of national income devoted to defence could be increased. Some examples of the rising cost of armaments may convey the scale of the problem. The last conventional cruiser built for the Royal Navy, HMS *Blake*, completed in 1961, cost £14,940,000; HMS *Cornwall*, an armoured cruiser of similar size completed in 1904, cost £756,274. Most of the difference in price is accounted for by the changing value of money, but the relative costs in terms of what the nation could afford can be compared by measuring them as percentages of national income in 1904 and 1961 at current prices. Thus, *Cornwall* cost 0.046 per cent of national income, but *Blake* cost 0.067 per cent.¹³ If the navy had taken the same share of national income in both years, and had been equipped solely with cruisers of just under 10,000 tons, it could have afforded only two-thirds as many ships in 1961 as in 1904. This example understates the problem: the first dreadnought battleships cost about 0.1 per cent of national income; forty years later an aircraft carrier cost twice that percentage, or more than twice including its aircraft. Moreover, from 1918 the navy had to share the defence budget with the air force as well as with the army. The navy was bound to become smaller over time.

Comparison of costs of most weapons systems is difficult, for whereas ships can be priced as individual items, the cost of a tank or an aircraft depends upon how many are produced. Costs of research and development, and of industrial plant, per item of equipment are lower according to the number built, and the longer the period of production the greater are the opportunities to raise productivity (through learning by doing) and therefore to reduce the amount of labour and capital embodied in each item. However, it was estimated in 1951 that, whereas it had taken 1,100 machine hours to make a pre-war Hurricane fighter, the Hunter jet fighter first flown in that year took 8,000 machine hours to make.¹⁴ The

¹³ The figures used for national income in the calculation are for gross national product at factor cost, compiled by Charles Feinstein and published in B.R. Mitchell, *British Historical Statistics* (Cambridge University Press, 1988), p. 829.

¹⁴ Progress of Defence Programme, minutes of meeting between the Minister of Defence and the Secretary of State for Air, 11 Dec. 1951, PDP/M (51) 1, Ministry of Defence

average cost of a Canberra bomber, which was manufactured between 1949 and 1961, was £250,000, but in 1964 it was estimated that the production cost of its successor, the TSR-2, would be £2.8 million, plus £2 million for research and development, for each of the aircraft that the RAF wished to order.¹⁵ It is true that more advanced weapons systems were more effective than the ones they replaced, but similar technical advances were being made by potential enemies, and any relative advantage gained by adopting new technology tended to be short-term. The great powers were in the position of Alice and the Red Queen, in *Through the Looking-Glass*, of having to run very fast merely to maintain their relative position.

The problem was compounded by the tendency of the costs of paying, clothing and feeding service personnel, and employing civilians in depots, dockyards, design offices and research establishments, to rise in line with national income. As weapons systems became more complex, they required more maintenance: for example, a Lightning jet fighter squadron in the 1960s required twice as many men to service its aircraft as a wartime Spitfire squadron had required.¹⁶ Thus the proportion of the services' manpower devoted to support front-line units tended to rise. Consequently, any cuts in the size of the armed forces tended to be disproportionately at the expense of front-line units. One way to keep personnel costs down was to use conscripts, who could be paid less and kept in cheaper accommodation than long-service volunteers. Conscription was continued after the Second World War until it was phased out in the early 1960s, but was not popular with the services on account of the time required to train men who would serve only for a short period.

The costs of weapons systems could be cut if they were mass produced, which required standardisation, but with three armed forces carrying out a wide variety of roles there were limits to the extent to which the range of equipment could be reduced. Research and development costs could be shared by importing technology, either by buying equipment abroad or by producing foreign designs under licence. Imported equipment could be cheaper than home-produced equipment if the exporting country had larger-scale production, as was the case in the United States from the 1940s. Importing technology was not always

records, series 7, file 970 (DEFE 7/970), The National Archives of the United Kingdom (TNA).

¹⁵ Sir Richard Clarke to Sir William Armstrong, 3 Nov. 1964, Sir Richard Clarke papers (CLRK), 1/3/3/2, Churchill College, Cambridge.

¹⁶ Guy Hartcup, *The Silent Revolution: The Development of Conventional Weapons 1945–85* (London: Brassey's (UK), 1993), p. xxiv.

popular with British armaments firms, or even with patriotic historians: the adoption in the late 1930s of the American Browning machine gun by the RAF, and the Czech Bren light machine gun and the Swedish Bofors light anti-aircraft gun by the army, all for production under licence in Britain, was taken by Barnett as evidence of the 'partial decrepitude' of Britain's arms industry.¹⁷ However, from the point of view of economising on research and development costs, it made sense to import some designs, while exporting others.

Economics

The relative decline in Britain's economy, compared with other industrial countries, during the first eight decades of the twentieth century was clearly a factor limiting her ability to compete as a military power. Even so, output per person remained above French and German levels until the 1960s. Since Britain spent a higher proportion of her national income on defence than other Western European countries after 1945, her military expenditure remained greater than France's until 1968 and West Germany's until 1970. The disparity between Britain, on the one hand, and the United States and the Soviet Union, on the other, as regards ability to produce the full range of weapons systems was not obvious until the 1950s. From 1950 to 1969, however, total British defence expenditure averaged about 9.4 per cent of the American level and her attempt to match the superpowers' range of research and development with much more limited numbers of scientific and technological personnel resulted in high unit costs and cancelled projects.¹⁸

The connection between arms and wealth was first noted by Thucydides, who commented in the fifth century BC that 'war is a matter not so much of arms as of money, which makes arms of use'.¹⁹ The money to which Thucydides referred to was gold and silver, which could be used to purchase supplies abroad as well as at home. In fact, what he called money was identical to what we would now call foreign exchange. Britain could supplement her reserves of gold and foreign exchange by exporting goods and services, by selling overseas assets (in which there had been large-scale investment before 1914), or by borrowing from abroad. The availability of loans depended on the credit-worthiness of the British state and on the foreign policies of other countries, of which the most important was the United States. Pounds could be used for

¹⁷ Barnett, *Collapse of British Power*, p. 477.

¹⁸ Figure calculated from table in Kennedy, *Rise and Fall*, p. 495.

¹⁹ Thucydides, *The History of the Peloponnesian War*, ed. and translated by Sir Richard Livingstone (Oxford University Press, 1943), book I, section 83.

purchases only in the United Kingdom and in the sterling area, the latter comprising countries that tied the value of their local currencies to sterling and banked their reserves in London. Insofar as these countries could be persuaded to add to their reserves of sterling, Britain could import from them without increasing exports of goods and services. However, lack of industrial development in the sterling area outside Britain meant that such imports would be largely confined to food and raw materials. Ability to spend pounds on munitions depended upon what British industry could produce, and an attempt to spend more would push up prices, as clearly happened in both world wars, and could happen at other times. What mattered most as regards output of munitions were Britain's natural resources (very limited; mainly coal, prior to the development of North Sea oil in the 1970s), and the productivity of her labour force, the latter being strongly influenced by investment in industrial plant and new technology, as well as by the quality of management and the state of industrial relations.

Economists have put forward a number of reasons why defence expenditure may have an adverse effect on the economy. Malcolm Chalmers lists three: first, it tends to be at the expense of investment, and therefore of capacity for future production; second, it diverts scientific and technical resources away from commercial production; third, it harms the balance of payments by absorbing resources that might otherwise have been used to produce exports.²⁰ The idea that defence expenditure would crowd out investment in the civil sector was accepted by the Ministry of Defence by the 1950s (and much earlier by the Treasury), but international comparisons in the 1980s by Keith Hartley and John Singleton showed that the crowding out effect was felt unequally in different countries.²¹ This result is not surprising since crowding out is less likely to occur if there are unemployed resources (such as labour with appropriate skills). A fourth possible way in which defence expenditure can harm the economy is the effect of contracts on industry. Mary Kaldor has argued that the defence services were conservative in their requirements, and wanted more powerful versions of existing weapons systems rather than completely new ones. Her thesis is that over-elaboration of existing technologies produced what she called a 'baroque arsenal'. In her view, firms that became accustomed to contracts that had higher specifications than would be required for civil goods, and which neglected costs, became less able to compete in

²⁰ Malcolm Chalmers, *Paying for Defence: Military Spending and British Decline* (London: Pluto Press, 1985), p. 114.

²¹ Keith Hartley and John Singleton, 'Defence R and D and crowding out', *Science and Public Policy*, 17 (1990), 152-6.

markets for commercial products.²² This tendency, although difficult to quantify, may be added to the long list of reasons that have been put forward for Britain's relative economic decline.²³

Taxation is another factor that has to be taken into account. Normally chancellors of the exchequer tried to balance their budgets, either because that was what was expected of them in peace, down to 1939, or because the consequence of too great a gap between expenditure and revenue was a tendency for prices to rise, imports to exceed exports, the balance of payments on current account to move into deficit, the gold and foreign exchange reserves to fall, and for sterling to depreciate against other currencies, thereby raising import prices. In war, borrowing and its adverse effects would be accepted, just as a runner in a race will use up his or her reserves of strength in a final sprint, but normally borrowing was limited to what international financial markets would accept as sustainable. Even balanced budgets could have adverse economic effects if high tax rates discouraged enterprise or risk-taking on the part of businessmen, or effort on the part of workers, as may well have happened during and after the Second World War.

It should be emphasised that defence expenditure was only one of many factors that may have tended to hold back the growth of the national economy, and it was probably not one of the major ones, except in wartime. On the other hand, unlike most factors influencing the performance of the private sector, such as the structure of firms and the training of management, industrial relations, the productivity of labour or the design and marketing of products, it was something that government could act on directly. It should also be made clear that defence expenditure can have economic benefits, in the form of scientific and technological advances that may have applications within the civilian economy. Nor is all of the expenditure a net burden on the Exchequer: some of the money will return in the form of taxes paid by contractors

²² Mary Kaldor, *The Baroque Arsenal* (London: Deutsch, 1982). Seymour Melman, *The Permanent War Economy: American Capitalism in Decline*, rev. edn (New York: Touchstone, 1985), argues that American experience shows that lack of effective competition results in unnecessarily expensive products.

²³ Defence expenditure is not mentioned in Nicholas Crafts' comprehensive analysis in his *Britain's Relative Economic Performance 1870–1999* (London: Institute of Economic Affairs, 2002), but may have been a contributory factor to some of the reasons that he does give: cartelisation and poor productivity in firms that were kept going instead of being allowed to fail (defence departments tried to keep contractors going, often peddling out small orders, so that these firms would be available in war) and poor productivity in nationalised industries (which include the royal dockyards and royal ordnance factories, and one major aircraft firm, Short Brothers, taken over in 1943, and kept going on account of the employment it offered in Northern Ireland long after it would have otherwise been closed down).

and their workers, and unemployed or underemployed resources may be activated by the increase in demand originating from the government expenditure.²⁴ Given all the uncertainties about the interaction between defence expenditure and the economy, the best litmus test of whether defence expenditure is too high to be sustained indefinitely is whether the balance of payments on current account is in deficit. However, this test is not infallible as it may be possible to correct the deficit by cutting civil expenditure, both public and private.

A warning about statistics used in the chapters that follow is in order. There was no series of official statistics of British national income before the 1940s, although revenue per penny in the pound of income tax gave chancellors of the exchequer some idea of how the economy was prospering. Earlier figures for national income are estimates by economic historians. There is a bewildering variety of statistics for defence expenditure as a percentage of national income. Data for defence expenditure were compiled by the Central Statistical Office and the North Atlantic Treaty Organisation (NATO) according to different definitions. For national income, or product (which should in theory be equal), there are different data depending upon whether it is measured at market prices or factor cost. Gross domestic product (GDP) excludes net income from abroad; gross national product (GNP) includes that income. Figures in different tables may not be directly comparable, and should be regarded as showing trends rather than precise measurements.

Strategy

Turning to the third of the principal questions posed in this book, how best to deploy the armed forces, we come to strategy. Recently the term 'strategy' has often been used by politicians as a synonym for 'policy', but in this book strategy retains its military meaning, and policy covers the setting of political goals by ministers, the mobilisation of research and industrial resources, and the distribution of these resources between the services.²⁵ Traditionally strategy was concerned with the larger movement of armed forces in a campaign, on land or sea, in contrast with tactics, which dealt with manoeuvring in the presence of the enemy. However, by the twentieth century war was seen as involving all those parts of an economy that sustained the armed forces, justifying blockade to reduce imports of raw materials and other inputs required to

²⁴ Clive Trebilcock, 'Science, technology and the armaments industry in the UK and Europe, with special reference to the period 1880–1914', *Journal of European Economic History*, 22 (1993), 565–80.

²⁵ See Hew Strachan, 'The lost meaning of strategy', *Survival*, 47, Autumn 2005, 33–54.

produce munitions, and even food. Blockade was only one aspect of economic warfare designed to reduce an enemy's ability to supply his armed forces with munitions or fuel, or to maintain his morale. The strategic air offensive in the Second World War was another aspect, as was sabotage by the Special Operations Executive (SOE). Strategy came therefore to be concerned with all aspects of coercion used in support of foreign policy, a fact recognised by the inclusion of the Board of Trade (the predecessor of the Department of Trade and Industry) and the Treasury in discussions on defence.

Clausewitz famously defined war as a continuation of political activity by other means.²⁶ The same might be said of grand strategy. Prime ministers regarded war as too serious a business to be left to the professionals in the armed forces. In the First World War, David Lloyd George engaged in debates with generals on whether to seek alternatives to victory on the Western Front. In the Second World War, Winston Churchill took an even more active role, meeting the professional heads of the armed forces, the Chiefs of Staff, almost daily. The primary purpose of grand strategy may be to deter an aggressor rather than to wage war. Before both world wars there were those in Britain who hoped that Germany might be deterred by the prospect of blockade enforced by British sea power, and maintained over a longer period than Germany could stand owing to superior British economic strength. Germany was not deterred, but the hope was not wholly irrational: Hitler referred in *Mein Kampf* to the advantage of an alliance with Britain that would give Germany the assurance of being able to import food and raw materials.²⁷ A strategy of deterrence could shape defence policy along different lines from what might be required in war. In the 1930s the Chamberlain government gave higher priority to the air force than to the army because it thought that Germany was more likely to be deterred by the prospect of blockade if she knew that an attempt to land a 'knock-out blow' from the air would fail. In the post-1945 period the nuclear deterrent was given first priority in the hope that, in conjunction with the much larger American nuclear deterrent, it would prevent a major war. There was an additional political reason for possessing nuclear weapons: it was believed in London that they were the means of securing a seat 'at the top table' where Britain could influence American foreign policy.

²⁶ Carl von Clausewitz, *On War*, ed. and translated by Michael Howard and Peter Paret (Princeton University Press, 1976), p. 87.

²⁷ Adolf Hitler, *Mein Kampf*, trans. J. Murphy (London: Hurst and Blackett, 1939), pp. 541–2.

There has been much debate about whether there was a distinctive British way of warfare, exploiting Britain's insular position to create a larger navy than other powers, while using a relatively small army to support allies, mainly through operations on the periphery of Europe. In the eighteenth and early nineteenth centuries such a strategy allowed Britain's financial wealth and industrial output to be used to subsidise and equip allies, while blockade weakened enemies. However, the development of railways reduced the advantage in mobility that amphibious forces had previously had over land forces, and the development of air power in the twentieth century further restricted the possibilities of a purely maritime strategy.²⁸ Howard and other military historians have supported the alternative strategy of committing a strong British army to support France and Belgium.²⁹ Hew Strachan has pointed out that the debate is based on a false antithesis, since sea and air power were as necessary as land power to a balanced strategy in the twentieth century: secure sea communications were essential to a continental commitment of the army, and in 1914 and 1939 the navy and the army could agree that the defence of Belgium was crucial to the security of the United Kingdom, and therefore of the Empire.³⁰ Even so, at any given time, choices had to be made as to strategic priorities, in the light of developments in weapons systems and of the economic resources available. Edgerton has argued that technical change led to three phases in the British way of warfare: traditionally the Royal Navy was the principal expression of British power, but the rise of air power led to the RAF taking on this role and the nuclear deterrent was the centre-piece from the 1950s. The large, conscript armies raised in the world wars, and for about fifteen years after the Second World War, were exceptional. Normally Britain planned to rely mainly on technologically advanced, 'capital-intensive' sea and air power to bring pressure to bear on an enemy's economy and civil population as well as his army.³¹

The criteria for judging whether British policy took proper cognisance of technical, economic and strategic factors are difficult to establish. Great military thinkers, such as Clausewitz (1780–1831) and Antoine Jomini (1779–1869), and naval historians, such as Alfred Mahan (1840–1914)

²⁸ See David French, *The British Way in Warfare 1688–2000* (London: Unwin Hyman, 1990).

²⁹ Howard, *Continental Commitment*, p. 146. See also Barnett, *Collapse of British Power*, p. 581; Brian Bond, *British Military Policy between the World Wars* (Oxford: Clarendon Press, 1980), pp. 337–9.

³⁰ Hew Strachan, 'The British way in warfare revisited', *Historical Journal*, 26 (1983), 447–61.

³¹ Edgerton, 'Liberal militarism', 141–50.

and Sir Julian Corbett (1854–1922), laid down general principles.³² However, there was a lack of theory to guide policymakers when they came to allocate resources. Although Adam Smith had drawn attention in 1776 to the tendency for armaments to become more expensive over time, other major economists showed no interest in war prior to 1914. John Maynard Keynes, while an official at the Treasury, applied macroeconomics to debates in Whitehall on strategy in 1915–16. During the Second World War economists were concerned with the administration of war production or were engaged in producing statistical summaries for Winston Churchill's guidance, both when he was first lord of the Admiralty and when he was prime minister.³³ However, operational research – that is the quantitative analysis of how best to achieve strategic objectives – was dominated by scientists. Henry Tizard chaired the Air Ministry's Committee for the Scientific Survey of Air Defence in the late 1930s, and during the war scientists were engaged in wide-ranging operational research, which had some impact on major debates on anti-submarine warfare and strategic bombing.³⁴

The concept of cost-effectiveness did not enter the discourse of British policymakers until the 1960s, and was then imported from the United States. In 1960 the economists Charles Hitch and Roland McKean published *The Economics of Defense in the Nuclear Age*, which was described in the British Treasury in 1965 as 'the standard work on cost-effectiveness'. Hitch, who was comptroller of the United States Department of Defense, was involved in 1963 in talks with British Treasury officials, who encouraged the Ministry of Defence to adopt cost-benefit analysis, sometimes against the opposition of the armed forces.³⁵ The 1960s were the high point of the influence of economists on American defence policy, enjoying as they did the patronage of

³² See Azar Gat, *A History of Military Thought: From the Enlightenment to the Cold War* (Oxford University Press, 2001).

³³ John H. Whitaker, 'The economics of defense in British political economy, 1848–1914', in Crauford D. Goodwin (ed.), *Economics and National Security*, supplement to *History of Political Economy*, 23 (1991), 37–60; Robert Skidelsky, *John Maynard Keynes*, 3 vols. (London: Macmillan, 1983–2000), vol. I: *Hopes Betrayed 1883–1920*, pp. 309–15; D. N. Chester (ed.), *Lessons of the British War Economy* (Cambridge University Press, 1951), chs. 2, 4 and 7.

³⁴ Maurice Kirby, *Operational Research in War and Peace: The British Experience from the 1930s to 1970* (London: Imperial College Press, 2003).

³⁵ Sir Richard Clarke to Sir Leslie Rowan, 21 Jan. 1965, and Clarke to Sir William Armstrong, 'Insight on defence costs', n.d., CLRK 1/3/4/1, Churchill College, Cambridge. In addition to *The Economics of Defense in the Nuclear Age* (Cambridge, Mass.: Harvard University Press, 1960), Clarke also recommended McKean's 'useful essay', 'Cost-benefit analysis and British defence policy', in Alan Peacock and D. J. Robertson (eds.), *Public Expenditure: Appraisal and Control* (Edinburgh: Oliver and Boyd, 1963), pp. 17–35.

Robert McNamara, the secretary of defense, and few policymakers in London could have remained unaware of the concept of opportunity cost when considering the long-range resource implications of new projects for weapons systems.³⁶ Opportunity cost, represented by alternative uses to which resources employed in research and development, or production, or strategic deployment, could be put, and cost-effectiveness of weapons systems and strategies, provide the conceptual bases of this book.

Policymaking in context

Defence policy was not shaped solely by technical, economic or strategic considerations, nor was it the product of pure reason. The navy and army had long been accustomed to operating as independent services, co-operating from time to time in combined operations to land troops on an enemy shore, but normally pursuing their own strategic aims. There had also long been competition between the Admiralty and War Office for the funds from the chancellor of the exchequer's budget. Interdepartmental competition was intensified when the Air Ministry was created in 1918. Naturally each department pressed the advantages of expenditure on its particular service: the Admiralty would stress the importance of the protection of trade routes for an island nation dependent upon imports of food and raw materials; the War Office would point to the need to support allies on land; and the Air Ministry would conjure up the prospect of war being decided by bombers before navies or armies could have a decisive impact. Inter-service rivalries were part of wider bureaucratic politics in which the Treasury defended the interests of the taxpayer and a sound financial system; the Board of Trade tried to reserve sufficient industrial capacity to maintain export markets; and various departments concerned with civil expenditure on education, social services, health and housing made their claims for funds from the Exchequer. The Foreign Office, for its part, hoped that diplomacy could be backed by armed force. Normally an individual's perspective on defence policy reflected his position in bureaucratic politics, the classic example being Churchill, who was a strong advocate of expensive naval building programmes when he was first lord of the Admiralty before the First World War, but a stern critic of the naval estimates when he was chancellor of the exchequer in the 1920s. An apparent exception was Sir Warren Fisher, permanent secretary of the

³⁶ Robert J. Leonard, 'War as a "simple economic problem": The rise of an economics of defense', in Goodwin (ed.), *Economics and National Security*, pp. 261–83.

Treasury from 1919 to 1939, who urged ministers to rearm against Nazi Germany, but Fisher nevertheless approached strategic foreign policy from a Treasury perspective and looked for ways to make Britain secure without undermining her economic strength.³⁷ It was not only normal, but right, that policymakers should, in the first instance, see problems from the perspective of their own department, but it was important to have effective ways of co-ordinating the different departments' activities to serve an agreed strategy. The methods adopted to achieve such co-operation developed over time, but even in the 1960s strategy was strongly influenced by inter-service rivalries.

Policy was, of course, also shaped by the threats that Britain faced and by Britain's changing role in the world. Defence of the United Kingdom and its trade routes were the principal priorities, explicitly or implicitly, until the nuclear age, when prevention of war through the deterrent became first priority. Britain's traditional concern with the balance of power in Europe, and with the danger of invasion from the Low Countries, gave her common interests with France, even if the course of Anglo-French relations was rarely smooth. Britain was never strong enough on her own to protect her world-wide imperial, economic and strategic interests against more than one hostile great power. In the early twentieth century she relied upon the Anglo-Japanese alliance to protect her interests in the Far East. During the First World War she resorted to importing munitions from the United States, even while the latter was neutral, and became dependent upon American loans to pay for them. During the Second World War Britain came to rely upon the United States strategically as well as economically, and saw her as the only power that could counterbalance the armed forces of the Soviet Union after 1945.³⁸

Each chapter includes a section on the principal policymakers and the government machinery for taking decisions on an inter-service basis. There follow sections dealing with the development of weapons systems (including their tactical application); the economic resources available for their production; and the strategic choices taken in the period covered by the chapter. These themes are inter-related and inevitably there

³⁷ See G. C. Peden, 'Sir Warren Fisher and British rearmament against Germany', *English Historical Review*, 94 (1979), 29–47.

³⁸ There is a huge literature on Anglo-American relations. Particularly useful for background to this book are: John Baylis, *Anglo-American Defence Relations, 1945–84: The Special Relationship* (London: Macmillan, 1984); W. Roger Louis and Hedley Bull (eds.), *The Special Relationship: Anglo-American Relations since 1945* (Oxford University Press, 1986); and B.J.C. McKercher, *Transition of Power: Britain's Loss of Global Pre-eminence to the United States, 1930–1945* (Cambridge University Press, 1999).

is some overlap between sections. Indeed, the point of the book is that the three themes are parts of a connected whole. The questions addressed in each chapter include: were the services conservative in their arms requirements and was British industry backward in developing military technology? Did Britain strike the right balance between building up armed and economic strength? Was strategy optimal from the point of view of making the most of Britain's assets?

1 The dreadnought era, 1904–1914

Introduction

The years before the First World War saw radical changes in Britain's international relations, and consequently in defence policy. In 1902 the Cabinet's Committee of Imperial Defence (CID) identified the following priorities: first, defence of the United Kingdom from invasion, with France being seen as the main threat; second, defence of Britain's empire in India against a possible invasion from Russia; and third, defence of the route to India through the Mediterranean, against France and Russia.¹ These priorities reflected the prevailing imperial rivalries, and it was against the French and Russian navies that the Royal Navy's two-power standard had been designed in 1889 and reaffirmed in 1893. The German Reichstag passed a naval law in 1900 providing for a larger fleet, the purpose of which was to give Germany bargaining power over Britain in the event of the latter's navy being weakened in a war with France and Russia, but it was not until after the destruction of most of the Russian navy in the Russo-Japanese War of 1904–5 that Germany clearly became Britain's principal naval rival. Britain's traditional foreign policy objectives had been a balance of power in Europe, the independence of the Low Countries and the security of her trade routes and overseas interests, but so long as German military power was balanced by the Franco-Russian alliance of 1894, Britain could avoid European commitments. The origins of the tension that developed with Germany can be traced back to nineteenth-century commercial and colonial rivalries, but tensions with Russia and France were greater. British statesmen had long looked askance at Russia's expansion in Central Asia towards India. France resented Britain's occupation of Egypt, and Anglo-French rivalry on the Upper Nile led to a war scare over the Fashoda incident in 1898.

Control of the sea enabled Britain to defy European opinion during the Boer War (1899–1902), but the growing burdens of empire led

¹ Howard, *Continental Commitment*, p. 13.

Joseph Chamberlain to compare Britain in 1902 to 'a weary titan under the too vast orb of its fate'.² While one has to remember that Chamberlain was colonial secretary and speaking at a conference of prime ministers from the self-governing colonies – the future dominions – who he hoped would contribute more to imperial defence, there was good reason to improve relations with other powers. It seemed to the Foreign Office and the Admiralty to be expedient to avoid provoking American antagonism: the Hay-Pauncefote treaty of 1901 recognised American supremacy in the Caribbean; Britain agreed to the Americans building and fortifying the Panama Canal on their own, contrary to the Clayton-Bulwer treaty of 1850; and the Alaskan boundary dispute was resolved in 1903 at the expense of Canadian claims. Admiralty fears that the Royal Navy would be unable to match a Franco-Russian naval combination in the Far East led Britain to conclude an alliance with Japan in 1902, whereby each signatory agreed to support the other if it was attacked by more than one power. Anglo-French tensions were eased by an *entente* in April 1904, the basis of which was an agreement to recognise each other's respective predominant interests in Egypt and Morocco. An attempt by Germany to exploit Russia's weakness in defeat in 1905 by putting pressure on France over Morocco led to Anglo-French staff talks on what might be done in the event of war, but Keith Wilson has argued that the makers of British foreign policy were more interested in the Empire than in Europe, and saw an Anglo-Russian *entente*, such as was achieved in 1907 as their primary goal.³ Nevertheless, Germany's naval programme and erratic diplomacy led the Foreign Office to identify her as a threat even before a second Moroccan crisis in 1911 seemed to bring Europe to the brink of war.

Although the *ententes* did not commit Britain to give more than diplomatic support, military and naval practicalities required prior planning if diplomacy was to be backed by armed force. Anglo-French staff talks in December 1905 and January 1906 agreed arrangements for landing a British army at French ports in the event of war. Subsequent conversations led to substantial agreement on logistical problems by January 1908. Full-scale staff talks were resumed in 1910 and the detailed plans that were in place in 1914 had been agreed by 1913. Meanwhile, from 1907, French admiralty plans concentrated on the Mediterranean, tacitly depending on the British to handle the German navy, and following Anglo-French naval conversations in 1911 and 1912, Britain concentrated her navy in the

² Quoted in Aaron L. Friedberg, *The Weary Titan: Britain and the Experience of Relative Decline, 1895–1905* (Princeton University Press, 1988), p. 116.

³ Keith M. Wilson, *The Policy of the Entente: Essays on the Determinants of British Foreign Policy* (Cambridge University Press, 1985).

North Sea. Thereafter the British fleet in the Mediterranean was restricted to the equivalent of the navy of one of Germany's partners in the Triple Alliance, Austro-Hungary or Italy. Since France had the largest fleet in the Mediterranean, the reduced British presence there was still sufficient to ensure the predominance of the *Entente* powers.⁴

This chapter considers the following questions. Was Britain a technological leader in naval armaments? Did she lag behind other European nations as regards her army and her attitude to the possibilities of aircraft? What constraints were there on defence expenditure? Did the British government have a clear idea of what strategy would be pursued in a European war, and if not, why not?

Polymakers

Defence policy before 1914 was very much in the hands of the Admiralty and the War Office. No minutes were taken at Cabinet meetings, the sole record of the proceedings being a letter written by the prime minister to the king. Such interdepartmental co-ordination as took place was done through the CID, which was formed in December 1902, with the older Colonial Defence Committee and the Joint Military and Naval Committee as sub-committees. From May 1904 the CID had a permanent secretariat, and became an important forum for strategic debates, with sub-committees studying a wide range of issues. Only the prime minister was a permanent member, and in practice he could restrict consideration of defence policy to a small inner cabinet, along with their professional advisers. On the other hand, the CID was not an executive body; its recommendations became instructions only if endorsed by the Cabinet, and implementation was left to the departments concerned.⁵

A. J. Balfour, the Conservative and Unionist prime minister from July 1902 to December 1905, was credited by Winston Churchill as having 'a marvellous gift of comprehension and receptivity' and being able to 'adjust to all new phenomena'.⁶ It had been Balfour who had created the CID, and he took a keen interest in strategic issues. Remarkably, he was

⁴ Samuel R. Williamson, *The Politics of Grand Strategy* (Cambridge, Mass.: Harvard University Press, 1969).

⁵ John Gooch, 'Adversarial attitudes: servicemen, politicians and strategic policy in Edwardian England, 1899-1914', in Paul Smith (ed.), *Government and the Armed Forces in Britain 1856-1990* (London: Hambledon Press, 1996), pp. 53-74; Nicholas d'Ombrain, *War Machinery and High Policy: Defence Administration in Peacetime Britain, 1902-1914* (Oxford University Press, 1973).

⁶ Winston S. Churchill, *Great Contemporaries* (London: Thornton Butterworth, 1937), p. 204.

invited, as leader of the opposition from 1905 to 1911, to attend CID meetings, as an occasional adviser, and then from 1912 as a regular member. Thus he could criticise the Liberal government's defence estimates in Parliament, while helping to form the policies on which the estimates were based. The Liberal prime minister from 1905 to 1908, Sir Henry Campbell-Bannerman, had had experience of the defence departments as financial secretary to the War Office from 1871 to 1874; secretary to the Admiralty from 1882 to 1884, and secretary of state for war in 1886 and from 1892 to 1895. He seemed to be primarily interested in reducing the defence estimates, in line with Liberal party policy. In 1907 he published an article in the *Nation*, before the second Hague conference on disarmament that year, calling for a stop in the armaments race, while stressing the purely defensive reasons why Britain maintained the largest navy.⁷ Nevertheless, it was Campbell-Bannerman who sanctioned staff talks with France without consulting the full Cabinet, thereby beginning the practice of excluding the more pacifically inclined members of the government from defence and foreign policy. Campbell-Bannerman was dying by the time he resigned in April 1908, handing over to H. H. Asquith. Asquith had a barrister's ability to master a brief, and as prime minister he would listen patiently to Cabinet debates until he saw an opportunity to intervene effectively, a practice that made him seem detached and dilatory.⁸ His principal quality was his ability to hold his disparate party together.

Ministers in charge of the Admiralty and War Office were not expected to be defence experts; instead their role was to bring political judgement to bear on the issues presented to them by their professional advisers. Churchill, who was first lord of the Admiralty from October 1911 to May 1915, was exceptional in having his own ideas on strategy. King Edward VII took an active interest in the armed forces and was, in effect, represented on the CID by Lord Esher, a courtier and controversial *éminence grise*. It was Esher who chaired a committee on the reorganisation of the War Office in 1903, following the critical report of the Royal Commission on the War in South Africa, of which he had been a member. Esher's recommendations led to the creation in February 1904 of an Army Council, comprising the secretary of state for war, along with his senior military advisers, similar to the Board of Admiralty, and a General Staff whose head would be responsible for three directorates: military operations, staff duties and military training. The War Office was subsequently raised to an unprecedented level of

⁷ 'The Hague conference and the limitation of armaments', *Nation*, 2 March 1907.

⁸ Roy Jenkins, *Asquith* (London: Collins, 1964), pp. 279, 300.

efficiency by a reforming secretary of state, Richard Haldane, who held the post from December 1905 to June 1912. The fact that Haldane had no preconceived ideas and was willing to listen to professional advice made him a popular minister. He could argue from first principles, having read Clausewitz and other authorities, but it was in combination with Douglas Haig, director of military training (1906–7) and director of staff duties (1907–9) that he was most effective.⁹

Interdepartmental strategic planning was inhibited by the fact that the senior professional adviser at the Admiralty from October 1904 to January 1910, Admiral Sir John Fisher, the first sea lord, believed that war plans must be prepared in greatest secrecy and only communicated to the army on the outbreak of war. Within the Admiralty, the Naval Intelligence Department had acted as a *de facto* planning staff since 1887, but from 1906 Fisher established his own hegemony in planning matters by setting up *ad hoc* committees, including a Strategy Committee in 1908 under his own chairmanship, and finally a Naval War Council in 1909 which effectively sidelined the Naval Intelligence Department. Naval planning was for a time unsystematic and it was not until after Churchill had become first lord that a War Staff was created in January 1912.¹⁰ Fisher's influence was still felt after he retired as he acted as Churchill's unofficial adviser through extensive correspondence.

Apart from the Admiralty and the War Office, the departments most concerned with defence policy were the Foreign Office, the Colonial Office, the India Office, the Board of Trade and the Treasury. Foreign Office papers were frequently circulated to the CID, and a Foreign Office official chaired one of its most important sub-committees, that on Neutral and Enemy Merchant Ships. Sir Edward Grey, who was foreign secretary from December 1905 to December 1916, and was described by Asquith as 'sound, temperate and strong',¹¹ played a major part in identifying the risks that Britain faced. The secretary of state for the colonies nominated an assistant secretary to the CID secretariat to service the Overseas Defence Sub-Committee, and the secretary of state for India nominated an assistant secretary to deal with problems relating to the defence of the sub-continent. Most assistant secretaries, however, were drawn from the fighting services. The most influential proved to be Maurice Hankey, a captain in the Royal Marine Artillery, who had served in the Naval Intelligence Department before

⁹ Dudley Sommer, *Haldane of Cloan* (London: Allen and Unwin, 1960), pp. 165–9; Edward M. Spiers, *Haldane: An Army Reformer* (Edinburgh University Press, 1980).

¹⁰ Shawn T. Grimes, 'War planning and strategic development in the Royal Navy, 1887–1918', Ph.D. (University of London, 2004).

¹¹ Jenkins, *Asquith*, p. 195.

becoming naval assistant secretary of the CID in January 1908. He was appointed secretary to the CID in March 1912, a post that he held until his retirement in July 1938.¹²

Although the chancellor of the exchequer, as a senior member of the Cabinet, often took part in CID discussions, the Treasury's official role was to act purely as a financial check on defence expenditure. Each year government departments were required to submit to the House of Commons detailed estimates for the coming financial year (running from 5 April), and the estimates were subject to prior criticism by the Treasury to ensure that the proposals in them were economical for their intended purposes. Treasury criticism could secure minor economies but the chancellor's most effective weapon was to point out that a given increase in expenditure would mean so much on the income tax. Although the broad outlines of defence policy were discussed in the CID, the question of what could be afforded was a matter for the chancellor of the exchequer. If he and the minister in charge of a spending department could not agree on estimates for the coming year, the Cabinet would have to adjudicate. Inevitably there were major battles in Cabinet between the chancellor and the first lord of the Admiralty as a naval arms race with Germany developed.¹³

Naval weapons

In the early years of the twentieth century naval warfare was being transformed by rapid technological change, including improved gunnery, torpedoes and mines, and the introduction of submarines, radio and oil-powered turbine engines. Naval history has long focused on battleships, which were used as the principal yardstick in contemporary debates on naval strength. However, Nicholas Lambert has identified the torpedo and the submarine as the most dynamic technical forces for change, allied to financial stringency which forced Fisher to look for economical solutions to strategic and tactical problems. Fisher developed a theory of flotilla defence in coastal waters by submarines and surface craft armed with long-range torpedoes, while large armoured vessels, which came to be called battle-cruisers, would control the Empire's trade routes and communications. Lambert is aware that Fisher's ideas were not shared by all of his colleagues at the Admiralty, but believes that the seal of approval for Fisher's 'revolution' came with

¹² Stephen Roskill, *Hankey, Man of Secrets*, 3 vols. (London: Collins, 1970–4).

¹³ For more detailed account of Treasury control, see G. C. Peden, *The Treasury and British Public Policy, 1906–1959* (Oxford University Press, 2000), pp. 6, 49–56.

Churchill's decision to economise in the estimates for 1914/15 by substituting submarines for some battleships.¹⁴ The revolution was, however, incomplete. For another thirty years admirals would claim that battleships could be protected from hazards such as torpedoes and, later, bombers.

Battleships were heavily armed and armoured vessels whose purpose was to establish command of the sea by destroying the enemy's main battle fleet, or by bottling it up in its harbours. HMS *Dreadnought*, constructed in 1905–6, represented a major advance in armament and speed, so much so that all battleships and battle-cruisers built to similar or higher standards were known as 'dreadnoughts', while earlier battleships were termed 'pre-dreadnoughts'. The first battle-cruisers, the 'Invincible' class, were constructed in 1906–8 with guns as large as those of a battleship, but with lighter armour and more speed. Battle-cruisers were designed to be able to overtake and keep in touch with an enemy battle fleet, and perhaps slow it down by damaging some of its ships, thereby enabling the British battle fleet to catch up.¹⁵ They would also out-class the armoured cruisers that the French had designed to prey on commerce. Collectively battleships and battle-cruisers came to be known as capital ships.

Dreadnoughts represented a major increase in expense as well as fighting power. Pre-dreadnoughts completed between 1895 and 1904 had cost about £1 million each; the *Dreadnought* cost nearly £2 million, and the first battle-cruisers £1.75 million. However, the upward trend had been established before *Dreadnought*. In December 1913, when the Chancellor of the Exchequer, Lloyd George, and Churchill were in dispute over the 1914/15 estimates, the Treasury complained that the Admiralty had forced the pace in introducing improvements in warships. In particular, the 'King Edward' class of pre-dreadnoughts, completed between 1905 and 1906, had cost fully 25 per cent more than the preceding 'Queen' class.¹⁶ Churchill's response was that it was appropriate for the power that depended upon naval supremacy for its life to maintain leadership in warship design. Fisher was much criticised, both inside and outside the navy, for building dreadnoughts, on the grounds that he thereby did away with Britain's overwhelming

¹⁴ Nicholas A. Lambert, *Sir John Fisher's Naval Revolution* (Columbia: University of South Carolina Press, 1999).

¹⁵ 'Report of the Committee on Designs, 1905', Feb. 1905, Fisher of Kilverstone papers (FISR) 8/4, Churchill College, Cambridge.

¹⁶ 'Naval Estimates, 1914–15', December 1913, circulated for the use of the Cabinet by the Chancellor of the Exchequer, Lloyd George papers, Parliamentary Archives, London, LG/C/24/3/26.

superiority of about three to one over Germany based on pre-dreadnoughts. The *Manchester Guardian* spoke for many when it claimed that a policy of conservatism in naval design would have been more appropriate.¹⁷ On the other hand, as the First Lord of the Admiralty, Reginald McKenna, argued in 1909, pre-dreadnought ships were not yet obsolete, in that they could still give a good account of themselves in a fleet action.¹⁸ Pre-dreadnoughts were used extensively in the First World War in the Mediterranean, and the Germans had a squadron of them at Jutland. To find out where the balance of the argument between Fisher and his critics lies, one has to look in some detail at the novel technical features of dreadnoughts and the circumstances in which they were introduced.

The detailed design of the *Dreadnought* was worked out by an Admiralty Committee of Designs, which the First Lord, the Earl of Selborne, appointed, on Fisher's advice, in December 1904. Technological developments since the turn of the century suggested that a period of innovation was at hand. Indeed, the stability of design of battleships since the 1890s had been exceptional. Continuous innovation had been the feature of naval technology from the 1850s to the early 1890s, with steam supplementing and then replacing sail, iron and then steel replacing wood, gun turrets replacing broadsides, and high free-board replacing low free-board vessels, so that major warships were obsolescent about ten years after they were built. In contrast, all twenty-nine British battleships completed between 1895 and 1904 had a main armament of four 12-inch guns and a secondary armament of twelve 6-inch quick-firing guns. The 'King Edward' class supplemented this arrangement with an intermediate armament of four 9.2-inch guns, but these guns complicated the task of correcting gunnery ranges by observing where a salvo entered the water, as it was hard to distinguish the splashes made by the different sizes of guns. Improvements in gunnery after 1901 increased the range at which 12-inch guns could be effective, and the increased range of torpedoes made it desirable for battleships to engage each other at longer ranges than hitherto contemplated. Consequently the Committee recommended an all-big-gun battleship as the best type for Britain's needs. Even before he became first sea lord, Fisher had been an advocate of British warships having superior speed to their foreign rivals, both to get the battle fleet quickly to the decisive point and to give British admirals the opportunity to

¹⁷ *Manchester Guardian*, 27 Jan. 1910, cited in Arthur Marder, *From the Dreadnought to Scapa Flow: The Royal Navy in the Fisher Era, 1904-1919*, 5 vols. (Oxford University Press, 1961-70), vol. I, p. 56.

¹⁸ 2 HC Deb., 5s, 1909, c. 936.

outmanoeuvre the enemy. The development of the steam turbine engine, which offered a considerable advance on earlier triple expansion engines, had reached a stage when it was fit for use in a large ship. The *Dreadnought* dispensed with both intermediate and secondary guns, and mounted ten 12-inch guns, plus light guns for use against torpedo craft, and her turbine engines gave her a speed of 21 knots, compared with 19 knots for the 'King Edwards'.

Fisher was not alone in thinking in terms of ships that would be faster than battleships but have as big guns. The Japanese decided in the light of their experience in 1904–5 to build lightly armoured, slightly faster, versions of pre-dreadnought battleships. These new vessels, the first of which were completed in 1907, displaced 13,750 tons and differed from similarly sized British armoured cruisers in having a main armament of four 12-inch guns instead of six 9.2-inch guns. About the same time the well-known Italian naval designer Vittorio Cuniberti designed slightly smaller ships for the Italian navy with a main armament of two 12-inch guns. The 'Invincible' class of battle-cruisers, completed in 1908, displaced 17,250 tons and had an armament of eight 12-inch guns. They were also faster than the Japanese and Italian vessels, having a speed of 25 knots, compared with 20.5 to 21 knots. Fisher would have preferred to make the battle-cruiser the centre-piece of his capital ship programme. However, he was unable to persuade the Committee of Designs or Selborne that submarines and surface torpedo-craft were capable of taking over the battleship's coastal-defence function, or that the battleship could be dispensed with.¹⁹ Prior to the inter-war period, only the Germans and Japanese followed the British example by building battle-cruisers, whereas all great powers built dreadnought battleships.²⁰

The Royal Navy continued to set the pace regarding the design of capital ships. By the time that the first German dreadnoughts were coming into service in 1909, the Admiralty had decided to increase the size of the big naval gun from 12 inches to 13.5 inches, a step that led Germany to delay work on its dreadnoughts due to be built in 1910, to give time to study the implications of the new gun for the amount of armour required. Then, in 1912, Churchill sprang a surprise when he revealed that the five new ships to be laid down that year would be

¹⁹ Fisher, 'Naval necessities', 21 Oct. 1904, with Selborne's marginal comment, FISR 8/4, Churchill College, Cambridge.

²⁰ The United States laid down six battle-cruisers in 1920–1, but these were cancelled as a result of the Washington naval treaty, and the first American battle-cruisers – large cruisers in US Navy parlance – were not completed until late in the Second World War. France built two battle-cruisers in the 1930s.

'super-dreadnoughts', armed with eight 15-inch guns and having a speed of 25 knots that would enable them to act as a fast wing of the battle fleet. At that date the German navy had still not progressed beyond the 12-inch gun, and its first 15-inch gun vessels were not laid down until 1913–14. Moreover, the British super-dreadnoughts, the 'Queen Elizabeth' class, were the first British battleships to use oil instead of coal, making it possible to refuel more quickly and spend more time at sea than their German rivals. It is true that German warships had other qualitative advantages over the British, such as a system of subdivision and damage control by flooding and pumping that made their ships very difficult to sink. German gunnery also proved to be superior, especially as regards their opening salvos. The Admiralty missed the opportunity presented by the development of a new system of fire control by Arthur Pollen between 1905 and 1912 to steal a march on the Germans, and, although elements of his system were included in the one finally adopted, the outcome was less than optimal.²¹

Nevertheless the Admiralty could not fairly be described as conservative in regard to naval technology, especially with regard to torpedoes. Destroyers had evolved as a countermeasure to protect battleships against attack in coastal waters by torpedo boats at a time when the Royal Navy's most likely opponent was France. The earliest examples in 1894 had displaced 220–300 tons but ten years later the 'River' class displaced 527–566 tons. The Committee of Designs recommended in 1905 that in future surface torpedo-craft should be of two types: ocean-going destroyers of 600 tons and coastal types of 250 tons. The latter category was built only in 1906–8 but ocean-going destroyers of 1,000 tons were being completed by 1912. Increased size enabled them to escort the battle fleet in the North Sea, and to attack the enemy fleet with torpedoes. When the first submarines – of an American design – were introduced into the Royal Navy in 1902, they were regarded as defensive weapons, but by 1910 British firms had produced craft capable of offensive operations off the German coast. Britain adopted the submarine four years before Germany and had about twice as many in service as the Germans in 1914. If anything, the Royal Navy was too willing to invest in untried technology. In 1912 an Admiralty committee on the design of future submarines recommended that there should be two types: economy-sized ones suitable for coastal defence, and a new, larger type with range and surface speed that would enable it to operate with the fleet. The concept of the fleet submarine

²¹ Jon Tetsuro Sumida, *In Defence of Naval Supremacy: Finance, Technology and British Naval Policy* (London: Unwin Hyman, 1989), pp. 71–100, 331–7.

proved to be flawed (increased surface speed being achieved at the expense of underwater performance), and the resources devoted to develop these vessels would have been better used to build more of the existing, successful, conventional design for long-range patrol submarines capable of operations off the German coast.²² One weapon that the Royal Navy did not develop to the same extent as other navies was the mine, despite the sinking of three battleships that struck mines during the Russo-Japanese War. The Admiralty preferred to use its limited funds to build warships rather than to develop a technology whose benefits and dangers it underestimated.²³

Overall, however, the Royal Navy was a technical leader. It could draw upon the expertise of the world's leading warship designers and builders. Britain dominated the naval arms trade before 1914: for example, British shipyards received export orders for eight dreadnoughts, compared with two placed with American yards and one with a German firm.²⁴ The Royal Navy also had the advantages of confidence arising from a long tradition of victory and the fact that its ships were manned by long-service volunteers, whereas the German navy relied mainly on short-service conscripts.

Army weapons

The Boer War had exposed considerable weaknesses in the army. One consequence was that the War Office decided to adopt quick-firing guns: an 18-pounder for the Field Artillery and a 13-pounder for the Horse Artillery. By 1904 the lighter gun was giving better results in trials, and it was suggested that it should be used by both arms of the artillery. Balfour, typically, decided to go into the technical aspects of the question himself, and in December 1904 he came down in favour of the heavier gun as the principal weapon for infantry divisions, although it was not ready for production until mid-1905.²⁵ As a consequence, the British army's standard field gun in 1914 fired a heavier shell than the German 77 mm (15 pounds) or the famous French 75 mm (16 pounds). Once in opposition, the Conservatives criticised the Liberal government for providing the army with equipment that was inferior to that of

²² Nicholas Lambert, 'British naval policy, 1913–14: financial limitation and strategic revolution', *Journal of Modern History*, 67 (1995), 595–626.

²³ Peter F. Halvorsen, 'The Royal Navy and mine warfare, 1868–1914', *Journal of Strategic Studies*, 27 (2004), no. 4, 685–707.

²⁴ The figure of eight includes a battle-cruiser for Australia but not three battleships built by a British syndicate in Spain. Both Austria-Hungary and Russia ordered British turbines and boilers for their dreadnoughts.

²⁵ Kenneth Young, *Arthur James Balfour* (London: G. Bell and Sons, 1963), p. 232.

continental nations, but in 1912 Colonel J.E.B. Seely, the under-secretary of war, felt able to state that Britain's quick-firing guns were superior to all others, except perhaps the French. He also claimed that the British army's latest howitzer was the best in existence, but in doing so he overlooked the fact that the German army was more liberally supplied with heavy guns than the British.²⁶ Indeed, artillery capable of levelling earthworks was a neglected feature of the Edwardian army because the General Staff doubted whether siege artillery would play a major part in any future European war and preferred lighter, shrapnel-firing guns suitable for use against men in the open. The shortage of high-explosive shells that the army was to experience in 1914–15 was thus partly a result of military doctrine. The 18- and 13-pounder guns were designed for mobile warfare, but their ability to fire between 3,600 and 5,400 shells in an hour far exceeded what could be sustained by horse-drawn wagons. The army made considerable progress in mechanising its transport in the ten years before 1914, but motor vehicles were not yet sufficiently advanced to be effective except on macadamised roads. Consequently gunners were instructed to conserve ammunition by limiting themselves to short bursts of accurate fire, and reserves of ammunition were quite inadequate for the heavy bombardments that were typical of the First World War.²⁷

The allocation of two heavy machine guns to each battalion was likewise to prove to be woefully inadequate in the light of wartime experience, but was the same as in the German army in 1914. The main British shortcoming was a lack of clear tactical ideas about how to use machine guns, reflecting prolonged disputes between the artillery on the one hand, and the cavalry and infantry on the other, as to who should control the guns. Reliance on heavy machine guns was thought to be likely to hamper the infantry's manoeuvrability. As with quick-firing field guns, army manuals stressed the need to conserve ammunition by restricting their use to repelling mass attacks.²⁸ The British army was not alone in underestimating the effects of modern firepower and overestimating the importance of the bayonet and other forms of cold steel. The cavalry, who were still equipped with lances or sabres as well as rifles, seem old-fashioned to the modern eye, but no more so than

²⁶ 35 HC Deb., 5s, 1912, cc. 51–2.

²⁷ David French, 'The military background to the "shell crisis" of May 1915', *Journal of Strategic Studies*, 2 (1979), no. 2, 192–205; Graham R. Winton, 'The British Army, mechanisation and a new transport system', *Journal of the Society for Army Historical Research*, 78 (2000), 197–212.

²⁸ T.H.E. Travers, 'The offensive and the problem of innovation in British military thought 1870–1915', *Journal of Contemporary History*, 13 (1978), 531–53.

their German equivalents, who were similarly armed. Compared with the French, who took the field in uniforms closely resembling those of 1870, with cavalry in breast plates and infantry in red trousers, British soldiers, in their sober khaki, were very modern in appearance. Moreover, experience in the Boer War had led Lord Roberts, the commander in chief of the British army, to conclude that the rifle would be the cavalryman's principal weapon, and despite resistance from traditionalists, the British cavalry was trained to fight on foot as well as on horseback, and could provide mobile firepower, whereas most continental European training emphasised charging with lance or sabre.²⁹

The biggest changes to the army related to its organisation. Britain alone among the combatants in 1914 had no form of compulsory military service. The advantages of volunteers, who served for longer periods than conscripts could have been required to do, were more time for training and for service in the Empire. On the other hand, volunteers had to be paid more than conscripts and were fewer in number, so consequently the army had no large reserves for an extended campaign. Roberts resigned from the CID in November 1905 to become president of the National Service League, which agitated for some form of compulsory service for home defence (thereby releasing the Regular Army for service overseas). The Conservative leadership, however, resisted taking up the cause of conscription, seeing it as an electoral liability. Senior army officers were divided on the question.³⁰ Haldane's solution to the problem of home defence and reserves was to reorganise the old part-time Volunteers and Militia into what in 1907 became the Territorial Army. The Territorials differed from their Victorian predecessors in being organised into divisions composed of all arms, infantry, cavalry, artillery and engineers, but, like them, they lacked the training to enable them to take the field at the outbreak of a war. The size of the force that could be sent to France was also limited by the deployment of about half of the Regular Army's field units in the Empire (mainly India). Haldane's greatest achievement was to organise the Regular Army at home into the British Expeditionary Force (BEF), comprising six Regular infantry divisions, each of nearly 19,000 officers and men, and one cavalry division of nearly 10,000 officers and men, ready for service in Europe.³¹ The BEF was small compared with the conscript armies that

²⁹ Marquess of Anglesey, *A History of the British Cavalry*, 8 vols. (London: Leo Cooper, 1973–97), vol. IV: 1899–1913 (1986), pp. 390–423.

³⁰ Hew Strachan, *The Politics of the British Army* (Oxford: Clarendon Press, 1997), pp. 109–11.

³¹ Spiers, *Haldane*, pp. 80–91.

France and Germany put in the field (90 and 98.5 divisions respectively), but it was an elite force.

Aircraft

Before the twentieth century an account of armaments would have been restricted to those required for sea and land forces. However, developments with airships and aeroplanes in the Edwardian period caught the public imagination, with the prospect of future wars being waged in a third dimension. In Germany, Count Ferdinand von Zeppelin had begun experiments with large, rigid airships in 1900, and by 1906 had achieved sufficient success for the German government to purchase one, which was declared to be the nucleus of the world's first aerial war fleet. In 1908 H. G. Wells published *The War in the Air*, a graphic, if fictional, account of an intercontinental war conducted by airships, which were described as capable of destroying cities by bombing. Meanwhile, in the United States, Orville and Wilbur Wright had flown the world's first powered, heavier-than-air machine in December 1903, and were making efforts to sell their secret to the military authorities of Britain, France and Germany, as well as the United States. Captive observation balloons had been employed by the British army since the 1880s, but had the disadvantage that troops on the reverse slopes of hills of moderate height and steepness remained concealed unless a balloon rose to such a height that the observer's view was liable to be obstructed by cloud. Powered aircraft would be greatly superior to balloons for reconnaissance purposes. The army hoped that aeroplanes would be able to fly over the enemy's rear areas, reporting troop movements; the navy hoped that airships and aeroplanes would be able to search great areas of sea very rapidly. Newspapers were more inclined to comment on the loss of Britain's insular security.

In October 1908 the CID set up a sub-committee to report on any 'reasonably probable' dangers presented by 'aerial navigation' in the near future; on the naval or military advantages of airships and aeroplanes; and on the amount of money that should be spent for experimental purposes. These questions were considered to be important enough to deserve the attention of ministers – Lloyd George, Haldane and McKenna – as well as senior army and navy officers. The committee appears to have been more impressed by airships than by aeroplanes. The former had greater range and carrying capacity, and it was known that Germany and France were considering their use for dropping bombs. In contrast the Wrights' aeroplane had flown for periods of only just over two hours at a time, and the committee had been 'unable to

obtain any trustworthy evidence to show whether great improvements may be expected in the immediate future, or whether the limit of practical utility may have already been nearly attained'. In fairness to the committee, it should be noted that it reported in January 1909, six months before Louis Blériot made his pioneering flight across the English Channel. Another consideration guiding the committee was their belief that airship development would be dependent on government funding, whereas aeroplanes appeared to offer an attractive field for private enterprise, given likely demand 'for sport and recreation'. Accordingly, the committee recommended that the navy estimates should include £35,000 for building a rigid airship for scouting and 'possibly for destructive purposes'; that the army estimates should include £10,000 for continuing experiments with 'navigable balloons' (small, non-rigid airships) to replace captive balloons; but that the experiments that the army had been making with aeroplanes since 1906 should be discontinued.³²

In the event, the navy's airship, the *Mayfly*, was damaged by a gust of wind during trials in 1911 and the Admiralty was so discouraged that it was not until 1914 that it ordered eight rigid airships. At the outbreak of war the navy had only seven small, non-rigid airships, of which four were too unreliable for operations at sea. In contrast, Germany's Zeppelins were to prove efficient scouts. The performance of aeroplanes was limited by the lack of powerful engines. One solution, adopted by the Short company in 1911, was to fit an aeroplane with two engines, but no orders were placed for twin-engined aircraft before the war (although both Italy and Russia had developed multi-engined bombers by 1914). In February 1911 the Air Battalion of the Royal Engineers was formed, with one company of aeroplanes and one of airships. In April 1912 the Royal Flying Corps (RFC) was created, with naval and military wings, and a central flying school to provide pilots for both services.³³ By January 1913 the CID was taking the Zeppelin threat seriously enough to enquire what weapons were available against it. At that date the War Office and the Admiralty were each experimenting with different high-angle guns, but none were in service for anti-aircraft defence.³⁴ Lack of inter-service co-operation was also evident at the same meeting with

³² 'Report of the Aerial Navigation Committee', 28 Jan. 1909, Cabinet Office records, series 16, volume 7 (CAB 16/7), TNA. For the context of the committee's deliberations, including British reactions to the Wright brothers' experiments, see Alfred Gollin, *No Longer an Island: Britain and the Wright Brothers, 1902-1909* (Stanford University Press, 1984).

³³ For an account of these early developments see Hugh Driver, *The Birth of Military Aviation: Britain, 1903-1914* (Woodbridge, Suffolk: Boydell Press, 1997).

³⁴ CID minutes, 7 Jan. 1913, CAB 2/3, TNA.

regard to the development of aeroplanes: Churchill, as first lord, believed that the requirements of the navy and army were divergent, with the navy being primarily interested in sea-planes, whereas Seely, now secretary of state for war, disagreed, suggesting that the machine of the future would probably be interchangeable, able to land on land or water.³⁵ The RFC's military wing had a policy of standardising production of a single type, the B.E.2C, a product of the government-owned Royal Aircraft Factory (although small numbers of machines of different designs were also ordered from private firms), whereas the naval wing had a policy of relying entirely on the designs of private firms. Given these differences, and the usual friction between the services, it is not surprising that the Admiralty decided to break away from the RFC to form the Royal Naval Air Service (RNAS) on 1 July 1914.

At the outbreak of war, the combined first-line strengths of the RFC and RNAS totalled 113 aeroplanes, in comparison with France's 120 aeroplanes ready to take the field and Germany's 232. Given that the aeroplanes of the three powers had limited range and carrying capacity, and were regarded as suitable only for reconnaissance, the RFC's first-line strength of sixty-three aeroplanes was large in relation to the BEF, which, as noted above, was less than a tenth of the size of the German or French armies.³⁶ Moreover, the RFC was already preparing for air combat. The naval wing of the RFC had conducted trials in April 1914 on how best to use aircraft to repel an air attack. A true fighting machine, the Vickers F.B.5, which could mount a machine gun, had been ordered for the naval wing in December 1913 and the contract was subsequently taken over by the War Office. The navy had also conducted successful experiments in launching aeroplanes from warships in 1912 and 1913, and as a result had ordered the world's first ship to be completed as an aircraft carrier, HMS *Ark Royal*, which was fitted with cranes to lift seaplanes on to and out of the water. The evidence is that, after a slow start, the British armed forces were taking war in the air seriously by 1914.

The economy and finance

The size of the armed forces that Britain could maintain was determined by the growth of her economy, and therefore of the chancellor of the exchequer's revenue, relative to the growth in the cost of armaments. Britain's lead as the first industrial nation was being eroded from the 1870s, and average annual growth rates in GDP and labour productivity

³⁵ Ibid. ³⁶ Edgerton, *England and the Aeroplane*, p. 10.

between the Boer and First World Wars were only about half the levels of the 1856–99 or inter-war periods.³⁷ There is evidence of a loss of competitiveness in what had been leading sectors, in particular coal, iron and steel and textiles, and a failure to establish a lead in new industrial sectors, such as chemicals and electrical engineering. Nevertheless, Britain's GDP in 1913 was still greater in total than that of any country except the United States and Germany, both of which had larger populations (USA: 97 million; Germany: 67 million; UK: 46 million), and Britain's GDP per capita was higher than that of any other European country.³⁸ Her share of world manufactured exports in 1913 was 30.2 per cent, compared with Germany's 26.6 per cent.³⁹ Moreover, the wealth accumulated from Britain's early lead in industrialisation had enabled her to invest more capital overseas than any other country. While calculation of overseas investment is not a precise science, it has been estimated that in 1914 about 44 per cent of the world's foreign long-term capital assets were in British hands, compared with 19.9 per cent for France and 12.8 per cent for Germany. Britain's overseas investments produced a stream of income that, on the eve of the war, was equivalent to 9.2 per cent of GDP.⁴⁰ Germany's GDP in 1913 was only 5.5 per cent more than Britain's,⁴¹ and this difference is cancelled out if one adds overseas income to GDP, to give GNP.

The inflow of income from overseas investments helped to pay for imports of food, raw materials and manufactures, while enabling Britain to reinvest large sums abroad. The City of London was the world's leading financial centre and Britain had the world's largest merchant navy. Income from financial services and shipping are treated in the balance of payments as 'invisible' exports, and in 1911–13 they amounted, on average, to £181.6 million, compared with £596.9 million for exports (including re-exports) of goods. The net income from overseas investments, £778.5 million, was greater than either of the other items on the income side of the balance of payments. The balance of payments was so far from being a worry to the Bank of England or the Treasury that no attempt was made to compile official data. However, the annual average balance of payments surplus on current account has

³⁷ R. C. O. Matthews, C. H. Feinstein and J. C. Odling-Smee, *British Economic Growth 1856–1973* (Oxford: Clarendon Press, 1982), pp. 23, 31.

³⁸ Angus Maddison, *Phases of Capitalist Development* (Oxford University Press, 1982), pp. 161, 184–5, 212.

³⁹ Alfred Maizels, *Growth and Trade* (Cambridge University Press, 1970), p. 189.

⁴⁰ Sidney Pollard, *Britain's Prime and Britain's Decline: The British Economy 1870–1914* (London: Edward Arnold, 1989), pp. 61–3.

⁴¹ Maddison, *Phases of Capitalist Development*, p. 161.

been estimated at over £200 million in 1911–13.⁴² The Treasury was indifferent to the fact that Britain's gold reserves were small in comparison with most other major countries as it was possible for the Bank of England to attract gold by selling securities or by increasing its discount rate (Bank rate).⁴³ The Treasury's confidence was not shared by everyone: the Secretary of the CID, Sir George Clarke, suggested in 1905 that Britain should have a two- or three-power standard in gold reserves to deal with international and domestic financial panics at the outbreak of a war.⁴⁴ In the event, the Treasury and the Bank of England were forced to extemporise emergency measures to cope with financial panic in August 1914. Even so, the strength of Britain's external financial position proved to be a major factor in sustaining Britain's war effort.

If Britain was so wealthy before 1914, why did she not spend more than she did on defence? It is worth pointing out that international comparisons of defence expenditure are difficult. Calculations for years before the Second World War based on percentages of national income are anachronistic, in that politicians and administrators did not use national income data before the 1940s. To complicate matters further, various definitions of national income are used by historians: GDP, GNP, and net national product (NNP), which is GNP less a deduction for estimated capital consumption. On data used by Avner Offer, defence expenditure, as a percentage of national income (of unknown definition), was broadly similar in Britain and Germany from 1870 to 1914, apart from the years of the Franco-Prussian and Boer Wars, averaging 2.95 per cent in the case of Britain and 2.86 per cent in the case of Germany. John Hobson originally calculated the average percentages of NNP spent on defence in the period 1870–1913 as 3.1 for Britain and 3.2 for Germany, but he revised his estimate for Germany to 3.8 in the light of new data which included items like strategic railways that had been included in the civil budget.⁴⁵ Table 1.1 shows that British defence expenditure rose year by year after 1908/9, but that the percentage of national income devoted to defence was no higher in

⁴² Pollard, *Britain's Prime*, p. 109.

⁴³ 'Treasury memorandum on the gold reserves, 22 May 1914', reprinted in R. S. Sayers, *The Bank of England 1891–1944*, 3 vols. (Cambridge University Press, 1976), vol. of appendices, pp. 3–30.

⁴⁴ French, *British Economic and Strategic Planning*, p. 17.

⁴⁵ Avner Offer, 'The British Empire, 1870–1914: a waste of money?', *Economic History Review*, 46 (1993), 215–38, at 224–5; John M. Hobson, 'The military-extraction gap and the wary titan: the fiscal-sociology of British defence policy 1870–1913', *Journal of European Economic History*, 22 (1993), 461–506, at 479; John M. Hobson, *The Wealth of States: A Comparative Sociology of International Economic and Political Change* (Cambridge University Press, 1997), pp. 67–8, 171, 202.

Table 1.1. *Defence expenditure as percentage of GDP, 1904/5–1913/14*

Financial year	Total defence expenditure (£m)	Percentage of GDP adjusted to financial year
1904/5	72.2	4.4
1905/6	66.0	3.8
1906/7	62.2	3.4
1907/8	59.2	3.2
1908/9	58.2	3.3
1909/10	59.0	3.2
1910/11	63.0	3.3
1911/12	67.8	3.4
1912/13	70.5	3.4
1913/14	72.5	3.4

Source: Mitchell, *British Historical Statistics*, pp. 589, 591, 829.

1913/14 than in 1906/7. The explanation for this apparent paradox lies in the fact that national income rose as rapidly in the recovery after a recession of 1907–8 as defence expenditure did. Britain could have spent more than she did; certainly the balance of payments was not a constraint, as it was to be from the 1930s to the end of the period covered by this book.

Restraint on defence expenditure was imposed by the conventions of political economy accepted by ministers and administrators of the day. Government expenditure on non-productive activities like defence was believed to divert money from private enterprise, the source of increasing wealth (and taxable capacity) of the community. This belief was not restricted to the Treasury: Grey, while foreign secretary, described expenditure on armaments as ‘unproductive’ although ‘of course, a form of insurance’.⁴⁶ Governments had to assess risk, but they did so in the belief that too high a premium in the form of taxation would have an adverse effect on the economy. The chancellor of the exchequer was expected to balance his budget at as low a level of expenditure (and therefore of taxation) as was compatible with the policies of the government. Wars could be financed by borrowing, but the consequence was to increase the charge to future budgets of interest on, and repayments of, the national debt. Balanced budgets, with some reduction of the national debt, in peace maintained confidence in British public finance, and thus made it possible for British governments to borrow at lower interest rates, in peace or war, than would otherwise

⁴⁶ French, *British Economic and Strategic Planning*, p. 15.

have been the case. Conversely, borrowing by government was believed to tend to raise interest rates in the country as a whole, to the detriment of trade and industry. The convention of balanced budgets ensured that normally an attempt by a minister to increase the expenditure of his department by a substantial amount would either reduce the funds available to other ministers, or lead to an increase in taxation. Consequently, the chancellor could usually find support among his Cabinet colleagues when he resisted a minister's demands. The Admiralty and the War Office tried to get round the discipline of the balanced budget by charging non-recurrent expenditure, such as dockyards or fortifications, to loans raised under successive Naval and Military Works Acts, but the Treasury maintained accountability by insisting that any such loan, except in wartime, must be kept apart from the rest of the national debt, with the interest on, and annual repayments of, the loan charged to the department concerned. In 1906 Asquith, in his budget speech, declared that this practice would stop, as it encouraged 'crude, precipitate and wasteful' expenditure.⁴⁷ Unfortunately for the Admiralty, this change in budgetary practice came at a time when new dockyards and defended bases were required in Scotland as a result of the need to match Germany in the North Sea.

The system of public finance meant that the level of defence expenditure was determined by how much revenue could be raised by taxation. Taxes could either be direct, as with income tax or death duties, or indirect, as with excise duties on items of expenditure, such as tobacco or alcohol, or, more controversially, customs duties on imports. Britain had adopted free trade in the middle of the nineteenth century, but Joseph Chamberlain resigned from Balfour's government in 1903 to campaign for 'tariff reform', by which he intended to 'broaden the basis of taxation' by raising more revenue from customs duties; to protect British industry from foreign competition; and to strengthen links with the self-governing colonies of the Empire by a system of imperial preference whereby goods traded within the Empire would be liable to lower customs duties than foreign goods. Eventually Chamberlain's campaign split his party, and Balfour resigned in December 1905. The issue of free trade or protection was a gift to the Liberals, who won the 1906 election largely because they could portray the Conservatives as the party of dear bread ('broadening the basis of taxation' and imperial

⁴⁷ *Parliamentary Debates*, 4th series, 1906, vol. 156, col. 290. For political economy and public finance, see G. C. Peden, 'From cheap government to efficient government: the political economy of public expenditure in the United Kingdom, 1832-1914', in Donald Winch and Patrick O'Brien (eds.), *The Political Economy of British Historical Experience, 1688-1914* (Oxford University Press, 2002), pp. 351-78.

preference would both require duties on grain). The Liberals looked instead to direct taxation to raise extra revenue. In 1909 Lloyd George's budget increased the standard rate of income tax from 1s (5p) in the pound to 1s 2d (5.8p); imposed an additional supertax of 6d (2.5p) on the small number of people (11,500) with annual incomes over £5,000; increased death duties on large estates; and, most controversially of all, introduced a 20 per cent duty on unearned increments in land values (payable when land was sold or inherited). The land values duty was seen as an attack on property and provoked the House of Lords to reject the 1909 budget, leading to a constitutional crisis that was only ended by the Parliament Act of 1911, which abolished the Lords' powers over finance bills. In retrospect Edwardian tax levels do not seem very onerous. However, in 1904 the Joint Permanent Secretary of the Treasury, Sir Edward Hamilton, had advised the Chancellor, Austen Chamberlain, that the 'normal' rate of income tax should in future be 11d (4.6p) to 1s (5p), with higher rates, of up to 2s (10p), held in reserve to finance a future war.⁴⁸ It was fortunate for the Liberals that revenue benefited from recovery from the recession in 1907–8. Tax revenue increased from £125.5 million in 1908/9 to £163 million in 1913/14, making it possible to finance both naval expansion and social reform within balanced budgets. In contrast, the German federal government, relying as it did on tariffs and other indirect taxes, which could not be raised without fuelling popular discontent with militarism, found itself unable to finance armed forces in line with its manpower and industrial strength.⁴⁹

Budgetary pressures on Admiralty expenditure were greatest from 1905 to 1908. In April 1904 Austen Chamberlain warned the Cabinet that 'the time has come when we must frankly admit that the financial resources of the United Kingdom are inadequate to do all that we should desire to do in the matter of Imperial defence'. Even the First Lord of the Admiralty, Selborne, believed that the naval estimates could not go on increasing every year, and it was agreed that, after an increase of £1 million in 1904/5, there should be a large, if unspecified, decrease in 1905/6.⁵⁰ Fisher's response to this challenge was to have 154 obsolete ships removed from the effective list. The Liberals were committed to further retrenchment, and reduced naval expenditure year by year until

⁴⁸ Martin Dauntton, *Trusting Leviathan: The Politics of Taxation in Britain, 1799–1914* (Cambridge University Press, 2001), esp. p. 320.

⁴⁹ Niall Ferguson, 'Public finance and national security: the domestic origins of the First World War revisited', *Past and Present*, 142 (1994), 141–68.

⁵⁰ Sumida, *In Defence*, pp. 24–5.

Table 1.2. *Distribution of defence expenditure by departments, 1904/5–1913/14*

Financial year	Total £m	Navy		Army	
		£m	percentage	£m	percentage
1904/5	72.2	35.5	49.2	36.7	50.8
1905/6	66.0	36.8	55.8	29.2	44.2
1906/7	62.2	33.3	53.5	28.9	46.5
1907/8	59.2	31.4	53.0	27.8	47.0
1908/9	58.2	31.1	53.4	27.1	46.6
1909/10	59.0	32.2	54.6	26.8	45.4
1910/11	63.0	35.8	56.8	27.2	43.2
1911/12	67.8	40.4	59.6	27.4	40.4
1912/13	70.5	42.9	60.9	27.6	39.1
1913/14	72.5	44.4	61.2	28.1	38.8

Source: Mitchell, *British Historical Statistics*, pp. 589, 591.

1908/9, and army expenditure, which had been declining in the aftermath of the Boer War, until 1909/10 (see table 1.2).

In opposition, the Conservatives criticised the Liberals for not spending enough on the armed services, but it was German naval expansion that forced the government to alter the pattern of the defence estimates. As table 1.2 shows, the navy took an increasing share of the available funds. In December 1908 the Admiralty proposed that six dreadnought battleships should be laid down in 1909/10 – two of them in February 1910, close to the end of the financial year. Ministers in favour of economy, including Churchill, then president of the Board of Trade, argued that four dreadnoughts would be sufficient. After lengthy debate the Cabinet agreed that four should be laid down in 1909/10, and four more in April 1910, at the beginning of the financial year 1910/11. Fisher, not content with this compromise, covertly encouraged the Conservatives and the press to campaign on the slogan: ‘we want eight and we won’t wait’, and the Cabinet had to agree to all eight vessels being included in the 1909/10 programme. Germany’s capacity to build naval guns, and therefore to complete dreadnoughts, was unknown to British naval intelligence, and the Admiralty naturally sought to make sure of a margin of safety.⁵¹ In the event, as table 1.3 shows, the difference in capital ships between the British and German fleets was at its narrowest in 1911 and widened thereafter. Moreover, Britain had an

⁵¹ Phillips Payson O’Brien, *British and American Naval Power: Politics and Policy, 1900–1936* (Westport, Conn.: Praeger, 1998), pp. 73–94.

Table 1.3. *Cumulative totals of dreadnought battleships and battle-cruisers completed at end of each year, 1906–16^a*

	UK	Germany	United States of America	Japan	France	Italy	Austria- Hungary	Russia
1906	1							
1907	1							
1908	4							
1909	8	2						
1910	10	4	4					
1911	14	8	6					
1912	22	12	8	2		1		
1913	27	17	8	3	2	1	2	
1914	32 ^b	19	10	4	4	3	3	4
1915	35 ^c	22	10	7	6	5	4	6
1916	43	25	14	7	7	6	4	6

Notes: ^a War losses not deducted from cumulative totals.

^b Not including two taken over from Turkey at outbreak of war.

^c Not including one taken over from Chile and completed in 1915.

Source: Randall Gray (ed.), *Conway's All the World's Fighting Ships 1906–1921* (London: Conway Maritime Press, 1985).

overwhelming superiority in pre-dreadnoughts (in 1914 the Royal Navy retained forty effective pre-dreadnoughts compared with Germany's twenty). Once Churchill became first lord of the Admiralty in October 1911, the year of the second Moroccan crisis, he became a fervent advocate of naval expansion, and the estimates for 1912/13, 1913/14 and 1914/15 all led to lengthy arguments between him and the Chancellor of the Exchequer, his political ally, Lloyd George. Although Churchill made some concessions, Treasury officials believed that they had lost financial control over the Admiralty, and that the level of naval expenditure was in effect determined by the ability of industry to meet orders.⁵²

There is evidence that the increasing demand represented by Admiralty orders forced up prices. Treasury figures showed that the battleship *Queen Elizabeth*, laid down in October 1912, and costing £2,431,872, would have cost £2,112,000 had it been built at 'Iron Duke' prices (the *Iron Duke* had been laid down in January 1912). The accounts of shipyards on the Clyde show that the profitability of work for the Admiralty was actually lower in 1909–14 than in 1899–1909, suggesting that higher prices reflected the cost of inputs rather than

⁵² Peden, *Treasury and British Public Policy*, pp. 52–5.

profiteering.⁵³ Nevertheless, Britain, having the largest shipbuilding industry in the world and well-established firms capable of building gun turrets and other equipment for warships, was able to keep ahead of Germany in the naval race. Table 1.3 shows the extent of British naval superiority over all of the other naval powers.

In contrast, War Office suppliers were kept short of orders. The Boer War had led private manufacturers, like Armstrong and Vickers, to increase capacity, although not quickly enough to cope with the rush of orders. In 1900 a committee chaired by the Joint Permanent Secretary of the Treasury, Sir Francis Mowatt, had recommended that industrial capacity for future wars should be maintained by placing orders to keep private firms reasonably active in peace, while also having a margin of ready capacity in the royal ordnance factories. However, by the time that the Government Factories and Workshops Committee met under another Permanent Secretary of the Treasury, Sir George Murray, in 1906–7 to examine ‘the economy of production in time of peace and the power of expansion in time of war’ the spirit of retrenchment had re-established itself. Murray and his committee forgot the lessons of the Boer War and recommended not only that the size of the state sector should be reduced, but also that the private firms should be kept short of orders so that the royal ordnance factories could be kept as fully employed as possible. The consequence of the government’s acceptance of the Murray Committee’s recommendations was that the army’s sources of supply for munitions were too limited for intensive fighting in a campaign against the German army.⁵⁴ Political opposition to conscription limited the size of the army, but there was scope for additional expenditure on creating industrial capacity for war-time production of munitions for allies as well as the BEF, without placing a strain on the economy. The absence of any provision for what in the 1930s were called shadow factories was a reflection of government decisions on strategy.

Strategy: planning for war

Once the threats to Britain’s overseas territories and interests had been dealt with through the Anglo-Japanese alliance and the *ententes* with

⁵³ ‘Cost of certain capital ships’, Dec. 1913, Treasury records, series 1, box 11598, file 25942 (T 1/11598/25942), TNA; Hugh Peebles, *Warshipbuilding on the Clyde: Naval Orders and the Prosperity of the Clyde Shipbuilding Industry, 1899–1939* (Edinburgh: John Donald, 1987), p. 158.

⁵⁴ Clive Trebilcock, ‘War and the failure of industrial mobilisation’, in J. M. Winter (ed.), *War and Economic Development* (Cambridge University Press, 1975), pp. 139–64.

France and Russia, the principal questions for strategists were: how could the United Kingdom and its trade routes best be protected? How could pressure best be brought to bear on Germany in war? How could European allies best be supported? Strategy was shaped by a number of influences. There were the facts of geography, particularly Britain's insular position and dependence on imports of food and raw materials. There was the evolution of armaments, which, as we shall see, influenced naval planning. There were economic and financial factors which set limits to the range of possibilities. There was also the experience of earlier wars in which Britain's naval preponderance had made possible a different strategy from that of continental powers. The naval historians Mahan and Corbett both argued that Britain had made best use of her circumstances by capturing colonies, by carrying out amphibious operations against the enemy's coastline, and by using wealth from trade to subsidise allies, rather than by sending large armies of her own to the European continent. Corbett, however, was more aware than Mahan of the limitations of this approach to warfare. He pointed out in *The Campaign of Trafalgar* (1910) that command of the sea had left Napoleon master of Europe, and he saw maritime strategy as an extension of a continental strategy, not as a competing alternative.⁵⁵ It is always difficult to trace intellectual influences on policymakers, but Corbett was close to Fisher and lectured at the Naval War College at Greenwich from 1900. His students would have been encouraged to think in terms of the strategic offensive, with the navy blockading the enemy fleet and controlling maritime communications, including neutral trade, and transporting and supporting the army in combined operations.⁵⁶ However, in assessing intellectual influences one has to take into account professional self-interest. Clearly a 'blue-water' strategy of waging war by maritime and economic means had more appeal to the navy than to the army.

The question of how best to defend Britain against invasion had long divided the services. The Admiralty argued that money was better spent on warships than on fortifications. The War Office was not prepared to concede that the army had no role in home defence, given the possibility that enemy raids might evade the navy. The CID's first investigation of

⁵⁵ For a comparison of Mahan and Corbett see Gat, *History of Military Thought*, pp. 441–93.

⁵⁶ Donald M. Schurman, *The Education of a Navy: The Development of British Naval Strategic Thought, 1867–1914* (London: Cassell, 1965), pp. 147–84; Barry D. Hunt, 'The strategic thought of Sir Julian Corbett', in John B. Hattendorf and Robert S. Jordan (eds.), *Maritime Strategy and the Balance of Power: Britain and America in the Twentieth Century* (Basingstoke: Macmillan, 1989), pp. 110–35.

the subject of an invasion of Britain took place in 1902–3, when the presumed enemy was France. The CID dismissed the possibility and subsequently its report was cited by Balfour in a statement in Parliament on 11 May 1905 in which he attempted to quieten public fears of invasion.⁵⁷ However, the press would not let the issue go. In 1906 the *Daily Mail* serialised William Le Queux's novel *The Invasion of 1910*, in which German invaders were defeated by the members of rifle clubs. The public's fears were used and reinforced by Roberts and others who wanted compulsory military service.⁵⁸ At Balfour's suggestion, a CID sub-committee re-examined the question in 1907 and 1908. It concluded that so long as the navy commanded the sea an invasion was impracticable, while if command of the sea were lost permanently no military force at home could prevent defeat (given Britain's dependence on overseas trade). To that extent the CID endorsed the 'blue-water' school, whose most forceful proponent at the time was Fisher. On the other hand, the CID recommended that the army units to be maintained for home defence should be large enough not only to deal with small raids but also to compel a prospective invader to use 70,000 men; the argument being that it would be impossible for so large a force to evade the Royal Navy. This concession to the War Office's views meant that a substantial part of the army's Regular units would remain at home until the Territorial Army had been embodied and trained, a period presumed to be at least four months.⁵⁹ A further CID enquiry in 1912–13, at which Roberts and other leading advocates of compulsory military service, Lord Lovat, Sir Samuel Scott and Colonel à Court Reppington, were invited to make oral as well as written statements, came to broadly similar conclusions, as did a fourth in April 1914.⁶⁰

Naval strategy required choices, since, even with a two-power standard, the Royal Navy could not match every other navy in all the seven seas. The distribution of the fleet in 1904 was still based on principles dating from before the invention of the electric telegraph and the introduction of steamships. These technical developments meant that fewer warships need be kept on foreign stations as reinforcements could be speedily summoned from home waters.⁶¹ In November 1904 the Naval Intelligence Department recommended a home fleet of twelve

⁵⁷ 146 HC Deb., 4s, 1905, cc. 65–77.

⁵⁸ A. J. A. Morris, *The Scaremongers: The Advocacy of War and Rearmament 1896–1914* (London: Routledge and Kegan Paul, 1984), pp. 103–9.

⁵⁹ 'Report of the sub-committee appointed by the Prime Minister to reconsider the question of oversea attack', 22 Oct. 1908, CAB 3/2, TNA.

⁶⁰ Reports of Standing Sub-Committee on Attack on the British Isles from Oversea, 13 Jan. 1913 and 15 Apr. 1914, CAB 3/2, TNA.

⁶¹ *Distribution and Mobilization of the Fleet* (Cd 2335), PP 1905, xlviii, 176–81.

battleships with its strategic centre at Dover; a Mediterranean fleet of eight battleships; and an Atlantic fleet of eight battleships based at Gibraltar, ready to reinforce either of the other fleets.⁶² These dispositions reflected the fact that France and Russia were more likely enemies than Germany. As it became apparent that the most likely war would be with Germany in the North Sea the concentration in home waters was progressively increased. By March 1909 a new Home Fleet had absorbed the former Fleet Reserve, the efficiency of the latter being increased by raising crew complements from 40 per cent to 60 per cent. In July 1914 the Royal Navy had what was by then called the Grand Fleet of twenty dreadnought and two semi-dreadnought battleships, and six battle-cruisers in home waters, plus three battle-cruisers in the Mediterranean and one Australian battle-cruiser in the Pacific. In comparison, Germany's High Seas Fleet had thirteen dreadnought battleships and four battle-cruisers, plus one battle-cruiser in the Mediterranean.

Trade protection was a matter for cruisers, of which Britain had 120 at the outbreak of war, excluding battle-cruisers and 3 Australian ships, compared with 49 German cruisers. Fisher was accused by his critics in 1905 of scrapping older cruisers that would have been useful for trade protection, a criticism endorsed by Arthur Marder.⁶³ In fact, when Admiral Tirpitz made his proposal for an enlarged German navy in 1897 he had commented that commerce raiding against England would be hopeless because of Germany's lack of bases with access to the high seas, and he had restricted cruiser construction to the minimum required for scouting for the main fleet, plus a few (nine in 1914) to represent German interests overseas.⁶⁴ The Admiralty had long studied how to protect British trade and was confident that it had sufficient cruisers for the purpose, although it has been argued that the defensive scheme of allocating cruiser squadrons to focal points left the Germans with too much scope for attacking merchant shipping, which was not organised into convoys until 1917.⁶⁵ Although Fisher predicted in memoranda to Churchill in 1912 and 1914 that submarines would be employed against merchant shipping, the Admiralty took the view that submarines were of no use for this purpose, since they could not carry crews large enough to take charge of a prize or accommodate crews of ships they wished to

⁶² Ruddock F. Mackay, *Fisher of Kilverstone* (Oxford: Clarendon Press, 1973), p. 313.

⁶³ Arthur J. Marder, *The Anatomy of British Sea Power: A History of British Naval Policy in the Pre-Dreadnought Era, 1880-1905* (London: Frank Cass, 1940), p. 495.

⁶⁴ Jonathan Steinberg, *Tirpitz and the Birth of the German Battle Fleet: Yesterday's Deterrent* (London: Macdonald, 1965), pp. 127, 209.

⁶⁵ Bryan Ranft, 'The protection of British seaborne trade and the development of systematic planning for war, 1860-1906', in Bryan Ranft (ed.), *Technical Change and British Naval Policy 1860-1939* (London: Hodder and Stoughton, 1977), pp. 1-22.

sink. CID discussions in 1913–14 focused entirely on the threat from cruisers or armed liners, and indeed it was only after the outbreak of war that the Germans began to plan commerce raiding with submarines.⁶⁶

The Admiralty had great hopes of the effectiveness of blockade against the German economy. Between 1906 and 1908 Captain Henry Campbell, the head of the trade division of the Naval Intelligence Department, undertook a study that showed that Germany was becoming increasingly dependent on imported food and raw materials as she industrialised, and his conclusion that a blockade of her ports would disrupt her trade and exhaust her capacity to finance a great war was adopted as part of the navy's strategy.⁶⁷ Unfortunately, there was no way of calculating how quickly such a strategy would be effective, given that Germany would be able to import goods from adjacent neutral countries, using her excellent railway system. The CID agreed in December 1912 to Lloyd George's suggestion that Britain would have to ration Dutch and Belgian imports to prevent goods from being re-exported to Germany.⁶⁸ Meanwhile, there had been considerable discussion of international law in relation to blockade. The second Hague conference, which met from June to October 1907, set up a committee representing the leading naval powers to draft a treaty that emerged in February 1909 as the Declaration of London. The British delegates were guided by the recommendations of a CID committee on Neutral and Enemy Merchant Ships, which had reported in March 1907 on how the British merchant marine could be left unmolested when Britain was neutral, as in the Russo-Japanese War, without limiting the effectiveness of blockade as a weapon when Britain was a belligerent. The Declaration of London classified goods aboard neutral vessels into three categories: 'absolute contraband', such as munitions or explosives; 'conditional contraband', such as food or clothing, which could be confiscated if bound for a military or naval destination; and 'non-contraband', including raw materials that had military as well as civil uses (for example, jute, from which sandbags were made). Hankey, as an assistant secretary of the CID, thought that the Declaration would diminish the efficacy of British sea power, but a memorandum from him led the First Lord of the Admiralty, McKenna, to take the view in 1911 that international treaties were easily evaded and some pretext to impose

⁶⁶ Marder, *Dreadnought to Scapa Flow*, vol. I, pp. 363–4; CID minutes, 6 Feb. 1913 and 21 May 1914, CAB 2/3, TNA.

⁶⁷ Avner Offer, 'The working classes, British naval plans and the coming of the Great War', *Past and Present*, 107 (1985), 204–26.

⁶⁸ CID minutes, 6 Dec. 1912, CAB 2/3, TNA.

a strict blockade would be found when it suited Britain to do so.⁶⁹ The Declaration was embodied in a naval prize bill that was passed by the House of Commons but rejected by the House of Lords. Even so, the Declaration was a guide to what would be acceptable to neutral powers, particularly the United States, with its longstanding attachment to the principle of the freedom of the seas. Avner Offer has argued that the deterrent of naval blockade failed to maintain peace in 1914 because the consequences were not visible enough to the Germans.⁷⁰ One could equally argue that Britain's lack of clear alliance with France and Russia gave Germany cause to hope that Britain might stay out of a European war.

The Admiralty was faced with the problem of how the blockade was to be applied. Initially it was assumed that, as in previous wars, there would be a close blockade of the enemy's ports. The capture of one or more of the islands off the German North Sea coast was projected by naval planners as a forward base or bases for the British light craft which would intercept merchant ships. Behind the light craft there would be capital ships ready to engage the German fleet when it came out, in the expectation that there would be a second Trafalgar. At first it seems to have been assumed that the new British ocean-going destroyers would provide adequate protection to the capital ships against German torpedo-craft. As awareness of the danger from the latter increased, plans were modified so that the British capital ships would withdraw at night to a distance beyond which German light forces could not reach if they sailed at sunset and were to be back in harbour by sunrise. By 1912 the planners had come to the conclusion that close blockade was too risky. The German islands were now heavily fortified and it was realised that German submarines and torpedo boats would be able to carry out a war of attrition against British advanced forces. An alternative plan was adopted for an 'observational blockade', with cruisers and destroyers patrolling a 300-mile line from south-west Norway to the centre of the North Sea and thence south to the coast of Holland, with the main battle fleet at sea to the west of this line. Then, in July 1914, this plan in turn made way for one for a distant blockade, with the exits from the North Sea closed by a Channel Fleet of pre-dreadnoughts in the Dover Straits and the Grand Fleet stationed in the north of Scotland to guard a line from the Orkney Islands to the Norwegian coast. This last plan greatly reduced Germany's opportunities for a war of attrition, and was

⁶⁹ Bernard Semmel, *Liberalism and Naval Strategy: Ideology, Interest, and Sea Power during the Pax Britannica* (Boston: Allen and Unwin, 1986), pp. 100–14.

⁷⁰ Offer, *First World War*, pp. 295, 351, 404.

almost as effective as a close blockade for intercepting her overseas trade.⁷¹

When the Admiralty and the War Office first began to make plans for war with Germany, in 1905, the navy advocated combined operations on the North Sea and Baltic coasts to divert part of the German army away from France. The War Office believed that these ideas were unrealistic, given the strength of Germany's coastal defences and the speed with which reinforcements could be moved by rail. In any case the General Staff had come to the conclusion that the German army would outflank France's strong fortifications on her eastern frontier by invading Belgium, and that an efficient British army of 120,000 men might just be sufficient to prevent German success on France's northern frontier. The General Staff hoped that, confronted by stalemate on land and blockade at sea, Germany would then make peace. As David French has pointed out, this kind of thinking overlooked the possibility that the war would be long drawn out and that the BEF, given the political impossibility of conscription, lacked the reserves for extended operations.⁷² A CID sub-committee on the military needs of the Empire, with Asquith in the chair, failed to resolve the differences between the Admiralty and the War Office in 1908–9 and left the decision of how to react to a German attack on France to be taken by whatever government was in office at the time. However, the General Staff was authorised to prepare plans to assist France in the initial stages of a war with Germany.⁷³

A further attempt to settle strategy was made at a famous meeting of the CID on 23 August 1911, during the second Moroccan crisis. Asquith arranged the meeting so as to exclude regular members who were opposed to a continental commitment: the Marquess of Crewe, the secretary of state for India, Lewis Harcourt, the secretary of state for the Colonial Office, and Viscount Morley, the lord president of the council and former secretary of state for India. The army's Director of Military Operations (DMO), Sir Henry Wilson, gave a well-prepared exposition of how it was planned to send the BEF's six infantry and one cavalry division to operate on the left flank of the French army, which was expected to deploy sixty-six divisions against the Germans' eighty-four. Sir Arthur Wilson, Fisher's successor as first sea lord, was more taciturn, and could only outline the Admiralty's plans for close blockade, the capture of advanced bases, and possible landings on the German coast. He also argued that the dispatch of the whole BEF would cause an

⁷¹ Marder, *Dreadnought to Scapa Flow*, vol. I, pp. 368–73.

⁷² French, *British Economic and Strategic Planning*, pp. 23–7.

⁷³ 'Report of the Sub-Committee of the CID on the Military Needs of the Empire', CID paper 109B, 24 July 1909, CAB 4/3, TNA.

invasion scare, forcing the navy on to the defensive, and depriving it of the troops needed for its strategy. Hankey, who was present, thought that no decision had been taken, but Asquith asked the searching question of what was the smallest force that could intervene effectively on the Continent, and was told that five infantry divisions would have almost as great a moral effect as six, and that four would be better than none. The possibility of having some Regular soldiers for amphibious operations or for home defence was thus left open. Nevertheless, in October Asquith made a crucial change at the Admiralty, replacing McKenna, who was opposed to a continental commitment, with Churchill, who accepted the army's viewpoint and who shelved plans for amphibious operations.⁷⁴

In the event the crisis was over by early November 1911 and Asquith saw no need to divide his Cabinet over the issue. The majority of ministers remained ignorant of the army's plans, and at the beginning of August 1914 all assumed that the traditional British way of warfare would prevail. It is hard to avoid the conclusion that Asquith's ministry failed to give clear strategic direction, with the result that the Admiralty and War Office made their plans for what were essentially parallel wars. The Admiralty prepared for blockade, and hoped that the German High Seas Fleet would respond to the challenge by coming out to fight. In line with the CID's recommendation in 1913, reaffirmed in April 1914, the General Staff was instructed to plan on the basis of having two Regular infantry divisions at home at the outbreak of war, to guard against raids, until the Territorial Army could be ready. The DMO, Wilson, and the Chief of the Imperial General Staff (CIGS), Sir Charles Douglas, objected to Britain's contribution to the crucial opening moves of the war being limited to four infantry divisions and one cavalry division, and in May 1914 secured Asquith's agreement that he would, if necessary, sanction the dispatch of an additional infantry division. In the event, a fifth infantry division did reach France in August 1914, but only after some delay on account of Cabinet misgivings about a continental commitment.⁷⁵

Summary

Britain's defence policy before 1914 had to be adapted to the change in most probable opponents from France and Russia to Germany and

⁷⁴ CID minutes, 23 Aug. 1911, CAB 2/2, TNA. See John Gooch, *The Plans of War: The General Staff and British Military Strategy, c. 1900–16* (New York: Halstead Press, 1974), pp. 290–2.

⁷⁵ Williamson, *Politics of Grand Strategy*, pp. 310–11, 362–6.

Austria-Hungary, and inevitably there was some uncertainty arising from the non-committal nature of the *ententes* with France and Russia. While there are examples of deficiencies in Britain's armaments, for example with regard to the navy's mines or the army's heavy artillery, there is no evidence of general technological backwardness on the part of the arms industry or of conservatism in the Admiralty and the War Office towards weapons procurement. On the contrary, the navy was highly innovative as regards capital ships and submarines and the army was up-to-date in quick-firing artillery. Both services were applying aircraft to their needs. More could have been spent on defence, particularly after 1908, but the government of the day saw no need to do so. Britain had the industrial capacity to keep ahead of Germany in the naval race, and political objections to conscription limited the size of the British army. Britain's insular position and wealth based on trade pointed to reliance on a maritime strategy of blockade, with support for allies limited to the BEF plus subsidies and supplies. However, more could have been done to prepare for war, particularly as regards industrial capacity to produce munitions. This shortcoming was partly the consequence of Treasury-inspired parsimony, but was also a result of a lack of a clear, overall strategy and a failure to appreciate the implications of a continental commitment in support of France and Belgium.

2 The First World War

Introduction

When Britain entered the First World War on 4 August 1914 Liberal ministers could agree on the aims of maintaining Belgian independence and excluding the Germans from the Channel ports. Asquith and Grey from the outset, and Lloyd George by 1915, also thought in terms of regime change in Germany, to make her more pacific by replacing 'Prussianism' with democracy. This third objective implied a greater margin of victory than the first two.¹ Britain found itself at war on the side of France and Russia against Germany and Austria-Hungary on account of a conflict between the last named power and Serbia. Gradually other countries were drawn in: Japan on 15 August 1914 to take over German colonies in the Far East; Turkey in late October 1914 to regain lost territories, thereby threatening British interests in the Middle East; Italy on 23 May 1915 to gain territory from Austria-Hungary; Bulgaria on 12 October 1915 to regain territory from Serbia; and Romania on 27 August 1916 to gain territory from Austria-Hungary. From the late autumn of 1914 trench warfare prevailed on the Western Front and ministers looked elsewhere for opportunities, most notably at the Dardanelles in 1915, where an unsuccessful attempt was made to break Turkey's stranglehold on access to the Black Sea. The United States remained neutral, but interpreted that status in a way that allowed the Allies to place orders there for munitions. It was only after the Germans adopted a policy of unrestricted submarine warfare on 1 February 1917, and British intelligence intercepted a telegram from Arthur Zimmermann, the German foreign minister, offering Mexico an alliance against the United States if the latter entered the war, that President Woodrow Wilson asked Congress on 2 April 1917 to declare that a state of war existed between America and Germany. This

¹ John Gooch, 'Soldiers, strategy and war aims in Britain 1914–1918', in Barry Hunt and Adrian Preston (eds.), *War Aims and Strategic Policy in the Great War 1914–1918* (London: Croom Helm, 1977), pp. 21–40.

accession of strength to the Allied cause was partially offset by the gradual defection of Russia following revolutions in March and November 1917. Germany's only hope of victory was to defeat Britain and France before large American forces could be put in the field, but a series of offensives in the spring and summer of 1918 failed to break the British and French armies, who counter-attacked successfully from mid-July. On 29 September, the German army commander, Erich von Ludendorff, secretly informed the Grand Committee of the Reichstag that the war was lost, and a new government was appointed on 1 October for the purpose of negotiating peace. Germany's allies were forced to accept armistices: Bulgaria on 30 September, Turkey on 30 October and Austria-Hungary on 4 November. Germany, her home front weakened by blockade, followed on 11 November. This chapter focuses on the technical, economic and strategic aspects of Britain's contribution to the Allied victory.

Policymakers

The lack of clear direction in strategy apparent before the war continued until at least December 1916. Asquith held the Liberal government together in the crisis leading to the war only with difficulty, ministers being divided between those who advocated neutrality, those (Grey and Churchill) who advocated intervention on the side of France and Russia, and those who did not make up their minds until Germany invaded Belgium on 3 August.² A Cabinet of about twenty was far too big to come to rapid decisions, and Asquith tended to call together a few ministers to deal with emergencies without any proper record of what they had decided being kept. In November 1914 he formed a War Council, originally with eight members, but the advantages that might have been gained from direction by a small group were lost within a few months as the membership rose to thirteen. The Council lapsed in May 1915, its functions in effect being taken over by the Dardanelles Committee in June and eventually by the War Committee in November 1915. Meanwhile Cabinet sub-committees proliferated, increasing the importance of the CID secretariat, and particularly of Hankey, as the deliberations of the various, often overlapping sub-committees required co-ordination. Even so, the secretariat had no executive powers and could only encourage representatives of independent departments to compromise in interdepartmental planning. In John Turner's judgement, the multiplicity of *ad hoc* committees gave opportunities to

² See Niall Ferguson, *The Pity of War* (London: Allen Lane, 1998), pp. 158–64.

different factions in the Cabinet to delay clear decisions on broad war policy.³ Asquith was not a great war leader, but he had to manage quarrelsome colleagues, and in his defence it can be said that the major decisions affecting the outcome of the war – the commitment of the bulk of the British army to the Western Front, the abandonment of economic orthodoxy, the creation of the Ministry of Munitions and the introduction of conscription – were taken while he was prime minister.⁴

Few ministers showed any talent for conducting war, and those who did might have benefited from greater willingness to listen to their professional advisers. Churchill's enthusiasm for strategic ends was not always accompanied by adequate reflection on the necessary means, as the Dardanelles episode was to show. Field Marshal Lord Kitchener, who was appointed secretary of state for war on 5 August 1914, enjoyed a great reputation as a soldier, but was unfamiliar with the work of the War Office and was temperamentally an autocrat, unaccustomed either to seeking or taking advice. He ignored the General Staff, which had in any case been weakened by the departure of many of its members with the BEF, with the result that plans for the Dardanelles operation were not subject to critical appraisal.⁵ In some respects Kitchener's appointment served to obscure rather than to clarify the direction of the nation's military effort as he combined ministerial responsibility and professional authority. During the Battle of the Marne in 1914 he went, in his field marshal's uniform, to the headquarters of Sir John French, the commander of the BEF, and overruled the latter's orders to retreat behind the Seine, thereby causing lasting hostility on French's part. Military strategy was settled by ministers in Cabinet on Kitchener's advice, although he frequently found it difficult to explain policy.⁶ He was the first person in authority to realise that the war could last for several years, reasoning that Germany would resist the Allies' superior numbers with the same determination as the South had resisted the North in the American Civil War.⁷ The Cabinet sanctioned his call for volunteers on 6 August without deciding what the strategic purpose of the new army would be. By the end of October 898,635 men had enlisted, more than the combined pre-war strength of the Regular and Territorial armies (707,466). It is not surprising that there was a

³ John Turner, 'Cabinets, committees and secretariats: the higher direction of war', in Kathleen Burk (ed.), *War and the State: The Transformation of British Government, 1914–1919* (London: Allen and Unwin, 1982), pp. 57–83, at p. 63.

⁴ George H. Cassar, *Asquith as War Leader* (London: Hambledon Press, 1994).

⁵ Gooch, *Plans of War*, pp. 299, 301–12, 316–17.

⁶ Strachan, *Politics of the British Army*, p. 128.

⁷ *Journals and Letters of Reginald Viscount Esher*, ed. Maurice Brett and Oliver Esher, 4 vols. (London: Ivor Nicholson and Watson, 1934–8), vol. III, pp. 192–3.

shortage of experienced officers and NCOs, or that training in about twelve months fell short of what could have been achieved with conscripts over two years.

Munitions for the army proved to be the Liberal government's downfall. On 9 May 1915 a British attack at Aubers Ridge failed for want of high-explosive shells. Five days later, *The Times* carried an article blaming the government for what became known as the 'shell crisis'. On 17 May Asquith resigned and formed a coalition with the Conservatives. Although the press attack had been inspired by Sir John French with a view to bringing down Kitchener, the latter remained at the War Office. However, responsibility for the production of munitions was transferred to a new Ministry of Munitions, headed by Lloyd George. Kitchener's influence was further diminished in December 1915 when Sir William Robertson was appointed CIGS. A strong character who, most unusually, had risen from the ranks, Robertson insisted that he was to be responsible to the War Committee and not to the secretary of state for war, which made the CIGS, not Kitchener, the government's principal adviser on military strategy. Kitchener departed from the political stage on 5 June 1916, when he was drowned after HMS *Hampshire*, in which he was sailing to Russia, was sunk by a German mine.

Lloyd George, whose reputation had risen with munitions production, took over at the War Office on 6 July. He was able to use even the reduced powers of his new post to strengthen his image as the man who could organise victory. Esher wrote in November, when the Asquith government was accused of failing to prosecute the war rigorously, that Lloyd George could 'get things done where other men cannot'.⁸ When Asquith resigned on 5 December, Lloyd George became the Liberal leader of a coalition dominated by the Conservatives. He established a war cabinet of five ministers, all except Andrew Bonar Law, the Conservative leader, who was chancellor of the exchequer, being without departmental duties. Other ministers were invited to attend when their departments' business was being discussed. In practice, the War Cabinet often delegated decisions to individual members, who would adjudicate in interdepartmental disputes or co-ordinate policy by chairing standing committees. Lloyd George's reform of the central direction of the war was accompanied by two parallel developments: the evolution of the Cabinet secretariat to prepare agenda, circulate memoranda and record minutes and conclusions, the last having the force of instructions

⁸ Bentley B. Gilbert, *David Lloyd George, a Political Life: Organizer of Victory 1912–1916* (London: B. T. Batsford, 1992), p. 386.

to departments; and the creation of his personal secretariat to act as policy advisers and as his eyes and ears to check that departments were acting on Cabinet decisions.⁹

Both as secretary of state for war and as prime minister, Lloyd George was determined to assert civilian control over the army. However, despite his centralisation of the direction of the war in the hands of the War Cabinet, generals continued to exercise considerable autonomy. Haig, who succeeded French as commander of the BEF in December 1915, had court connections. He and Robertson were mutually supportive in arguing that the war would be won on the Western Front, and they could pursue that strategy as long as they enjoyed the support of the Conservatives and the press. Lloyd George failed in an attempt to subordinate the BEF to overall French military command early in 1917 because of opposition from the King and from members of the War Cabinet. However, heavy casualties in the third Battle of Ypres (Passchendaele) between 31 July and 6 November weakened Conservative and press support for Haig and Robertson. In February 1918 the Prime Minister was able to replace the latter with Sir Henry Wilson and on 26 March, when the German offensive was driving a wedge between the British and French armies, Marshal Foch was appointed co-ordinator of all Allied forces on the Western Front.¹⁰ However, Foch's powers were limited, so that he could expect from Haig and the commanders of the French, American and Italian armies no more than optional execution of his instructions. Despite serious disagreements with Lloyd George, Haig survived as commander of the BEF, partly because the Prime Minister knew of no better general, but also because there were limits to how far civilian control over the army could be pushed.¹¹

Civilian control over naval affairs was likewise problematic. Churchill recalled Fisher as first sea lord on 29 October 1914 after Prince Louis of Battenberg resigned on account of public hysteria over his German birth. At first the renewed Churchill–Fisher combination was very successful. Fisher, now aged 73, had lost none of his ability to innovate. He ordered a large number of aircraft and small airships for reconnaissance. He was keen to revive his schemes for operations in the Baltic and placed orders for monitors – ships designed for coastal bombardment – and landing craft with bullet-proof bulwarks. However, he was strongly opposed to the Dardanelles expedition and eventually resigned on 15 May 1915 on the grounds that it imperilled ships required for the

⁹ John Turner, *Lloyd George's Secretariat* (Cambridge University Press, 1980).

¹⁰ Strachan, *Politics of the British Army*, pp. 131–8.

¹¹ David Lloyd George, *War Memoirs*, 6 vols. (London: Ivor Nicholson and Watson, 1933–6), vol. IV, pp. 2266–8, 2271–2; vol. VI, pp. 3414–16, 3421.

Grand Fleet. Churchill was replaced ten days later by Balfour, when Asquith formed his coalition government. The biggest crisis between ministers and admirals came after Sir John Jellicoe was appointed first sea lord in December 1916, and concerned the best way to respond to submarine attacks on merchant shipping. Lloyd George's memoirs are among the least reliable sources for the First World War, but there is no reason to doubt his veracity when he wrote that one reason why he did not insist on the Admiralty adopting convoys earlier than it did was because it was a serious thing for ministers, as amateurs, to interfere by exercising authority over the naval experts.¹² His attacks in his memoirs on admirals were no less bitter than those on generals, evidence of equal frustration in establishing civilian control.

The creation of a third defence department, the Air Ministry, in 1917, was a response to a lack of co-operation between the RFC and the RNAS and to the political necessity to be seen to be doing something about German air attacks on London. There had been a series of interdepartmental bodies: the Joint War Air Committee in February 1916, under Lord Derby; the Air Board in May 1916, initially under Lord Curzon and then, from December 1916, under Lord Cowdray; and the Aerial Operations Committee in September 1917, under the South African soldier-statesman Jan Christian Smuts. Smuts was the author of two reports in the summer of 1917 that were critical of the existing machinery of inter-service co-operation. He believed that the Air Board, lacking its own professional staff, functioned as a forum in which the representatives of the RFC and the RNAS could argue their cases, and could neither originate nor execute a policy of its own. Malcolm Cooper has argued that Smuts was unfairly critical of the Air Board's work and that the creation of the Air Ministry in November 1917 and the RAF on 1 April 1918 did not alter the existing distribution of resources, whereby support of the army on the Western Front enjoyed the highest priority.¹³

The work of the Air Ministry was not helped by a dispute between the first secretary of state, Lord Rothermere, and the first chief of air staff (CAS), Sir Hugh Trenchard, leading to the latter's resignation on 19 March 1918. As a press lord, Rothermere tended to treat his senior professional adviser as he might a newspaper editor. It was only after he was replaced by Lord Weir, a Scottish industrialist who had been controller of aeronautical supplies, that the Air Ministry began to function

¹² Ibid., vol. III, pp. 1135–40, 1149–53, 1169. For the myth of Lloyd George's role in the adoption of the convoy system, see pp. 85–6 below.

¹³ Malcolm Cooper, *The Birth of Independent Air Power* (London: Allen and Unwin, 1986), pp. 102–7.

like a normal department of state. The RAF certainly needed a safe pair of ministerial hands as it had inherited the rivalries that had developed between senior RFC officers from early in the war in the absence of strong central direction from London. Although Trenchard's character had inspired many officers while he was in charge of the RFC in France, his resignation as CAS may not have been altogether unfortunate. In Cooper's words, Trenchard was 'all but incoherent both verbally and on paper', and 'his inflexible faith in the offensive' led him to develop strategy and tactics without regard to the resources available.¹⁴

Treasury control over the armed forces' expenditure was an early casualty of the war. The discipline of balanced budgets lapsed as war-related expenditure was financed out of votes of credit. The Treasury attempted at the outbreak of war to establish a standing emergency committee, with representatives of the Admiralty, the War Office and the Treasury, to expedite Treasury procedures. However, the War Office declined to take part, preferring to have more or less a free hand when placing orders. There was thus no effective way of ensuring that departments did not force up prices by competing for the same resources, or by offering contracts that led to unusually high profits. Lloyd George himself, as chancellor, had no desire to limit war expenditure, and the Ministry of Munitions was among the most profligate of departments while he was in charge of it. Subsequently the Select Committee on National Expenditure reported in October and December 1917 that proper financial control, far from delaying the supply of munitions, would have accelerated it by preventing waste of material and labour, but steps to strengthen Treasury control were taken only slowly and had no influence on the conduct of the war.¹⁵ The Treasury's position was weakened further by the fact that Lloyd George's successor as chancellor, McKenna, was a political lightweight and unable to prevail over Kitchener and Lloyd George in Cabinet debates on strategy in 1915.

Naval weapons and tactics

Wartime experience quickly exposed the hazards facing surface ships. The first action between the British and German navies was the sinking by gunfire of the minelayer *Koenigin Luise* on 5 August, followed by the

¹⁴ Malcolm Cooper, 'A house divided: policy, rivalry and administration in Britain's military air command, 1914–1918', *Journal of Strategic Studies*, 3 (1980), no. 2 178–201, at 181 and 197.

¹⁵ Kathleen Burk, 'The Treasury: from impotence to power', in Burk (ed.), *War and the State*, pp. 84–107; Peden, *Treasury and British Public Policy*, pp. 114–18.

loss the next day of one of the British ships involved, the cruiser *Amphion*, when it struck one of the mines that the German vessel had laid. Also significant was the sinking of three armoured cruisers, the *Aboukir*, *Hogue* and *Cressy*, by a single German submarine in little more than an hour on 22 September 1914. The *Aboukir* was thought to have struck a mine and the *Hogue* and *Cressy* were torpedoed when they stopped to pick up survivors. In all 1,459 men were lost. These incidents brought out clearly the unpreparedness of the Royal Navy for mine and submarine warfare. The Grand Fleet's bases at Cromarty and Scapa Flow lacked protection against submarines and for a time the Fleet had to take refuge in more remote anchorages, including Lough Swilly, where one dreadnought, the *Audacious*, was sunk by a German mine. Minesweepers had to be improvised from requisitioned trawlers and drifters and from 1915 large orders were placed for fleet sweeping minesweepers (sloops), designed on merchant ship lines and capable of being built in six months in yards without previous naval experience.

Submarines, especially when submerged, were slower than other warships and even on the surface were too low in the water for their commanders to see far. Consequently attempts by either side to use submarines in fleet actions failed. However, mines and submarines proved to be very effective for coastal defence at the Dardanelles. The battle-cruiser *Inflexible* was damaged and the pre-dreadnoughts *Irresistible* and *Ocean* were sunk by mines while bombarding the Turkish defences on 18 March 1915. The pre-dreadnoughts *Triumph* and *Majestic* were sunk by the *U21* on 25 and 27 May respectively, demonstrating that the anti-torpedo nets with which the ships were fitted were ineffective. Despite these new dangers, capital ships continued to be seen by the Admiralty as the ultimate source of command of the sea. In February 1917 the War Cabinet had to instruct the Admiralty to cease work on three out of four 'Hood'-class battle-cruisers, to release shipbuilding capacity required to replace merchantmen sunk by submarines.¹⁶ At that date, intelligence reports indicated that the Germans had ceased work on all but one battle-cruiser, which was close to completion, in order to concentrate on building submarines.

Pre-war plans for trade defence had assumed that the German threat would come from cruisers, supplemented by armed liners. For this reason the Royal Navy had retained many old cruisers that required large crews. Cruisers had the advantage that they could remain at sea for longer than destroyers, and the twenty-six light cruisers completed during the war were useful additions to the fleet. However, large

¹⁶ War Cabinet conclusions, 8 Feb. 1917, CAB 23/1, TNA.

numbers of destroyers were needed for anti-submarine work. By standardising designs no fewer than 270 were built in the years 1915–18, and these were supplemented by sloops and armed trawlers. Detection of submerged submarines was made possible by the development in 1915 of the hydrophone, which could pick up the sound of a U-boat's engines. The earliest hydrophones could only indicate the presence of a U-boat somewhere in the vicinity but in 1917 new hydrophones could locate the direction in which the U-boat could be found. Radio intercepts gave longer-range warning of U-boat, and indeed all German naval activity. As will be described below (pp. 85–6), the decisive step towards defeating the U-boat was the adoption of the convoy system, but the range of technical innovation employed was impressive. Airships, seaplanes and, latterly, land-based aircraft were used to escort convoys and although it appears that only one U-boat was sunk by air attack, the effect of air patrols was to force submarines to submerge, making it difficult for them to locate their targets.¹⁷ The arming of merchant ships could also deter submarines from operating on the surface, and in December 1916 the Cabinet decided that guns for this purpose were to be the top priority in allocating industrial capacity, leading the War Office to forgo the production of 746 new guns, as well as transferring older guns from France.¹⁸

The Royal Navy made use of mines, submarines and aircraft to carry the war to the enemy. Although mine warfare had been neglected before 1914 and early British mines were ineffective, large minefields had been laid by the end of the war. Britain had 80 submarines in service at the end of 1914 compared with Germany's 38 and, although Germany built 353 U-boats of all sizes between 1915 and 1918, the corresponding British total was a still impressive 177, including eight ordered in the United States. From the outset of the war British submarines kept a close watch on the German coast, where they sank a cruiser and a destroyer in the autumn of 1914. During operations at the Dardanelles in 1915 two old Turkish battleships were sunk within the straits by British submarines. The Dardanelles were also the scene of the first successful air torpedo attack, on a Turkish transport ship, by a seaplane from a converted cross-Channel ferry. The capital ships and cruisers of the Grand Fleet carried over 120 seaplanes by the end of the war, and in October 1918 the fleet was joined by the world's first flush-decked aircraft carrier, HMS *Argus*. The Royal Navy had its deficiencies, as

¹⁷ John Terraine, *Business in Great Waters: The U-Boat Wars 1916–1945* (London: Leo Cooper, 1989), pp. 28–33, 74–7, 90, 125–7, 149.

¹⁸ War Cabinet conclusions, 20 Dec. 1916, CAB 23/1, TNA.

became evident when capital ships were lost as a result of internal explosions at the Battle of Jutland in 1916, but the British could hardly be described as technologically conservative.

One deficiency was lack of inter-service preparation for combined operations. Sir Ian Hamilton, the general in charge at the Dardanelles, was ignorant of the existence of the armoured landing craft that Fisher had ordered for service in the Baltic until told of their existence by naval officers of the Mediterranean fleet.¹⁹ These specialised vessels were not available to him until over three months after the first landings on the Gallipoli peninsula. Most troops went ashore in open boats towed by lighters, and consequently suffered heavy casualties from enemy fire.

Army weapons and tactics

The historiography of the First World War has long been dominated by the heavy casualties suffered on the Western Front. Names like the Somme and Passchendaele are still evocative of human suffering. The suffering seemed to be all the more deplorable since it was widely believed that different tactics could have reduced the scale of casualties. Churchill and Lloyd George complained that the generals had been, at best, unimaginative, Churchill emphasising the war-winning potential of the tank, the development of which he had encouraged while he was at the Admiralty and the Ministry of Munitions.²⁰ Military critics, such as Major-General J. F. C. Fuller, who had served with the Tank Corps, and Captain Basil Liddell Hart, who (having originally written about infantry tactics) adopted many of Fuller's ideas, both claimed that different tactical doctrines had been possible. Their ideas were popularised by writers such as Leon Wolff, whose widely read *In Flanders Fields* (1959) had an introduction by Fuller and cited four books written by Liddell Hart.²¹ To Fuller, the problem was how to restore mobility in the face of what he called 'the defensive trinity of bullet, spade and wire', and he saw answers in the use of gas and tanks.²² The view that the generals had failed to understand the nature of the warfare they were

¹⁹ Sir Ian Hamilton, *Gallipoli Diary*, 2 vols. (London: Edward Arnold, 1920), vol. I, pp. 44–5, 47, 148.

²⁰ Winston S. Churchill, *The World Crisis: 1916–1918* (London: Thornton Butterworth, 1927), part I, pp. 39–62; part II, pp. 302–9, 343–8, 522–4; Lloyd George, *War Memoirs*, vol. III, pp. 1469–70; vol. VI, pp. 3416–22.

²¹ Leon Wolff, *In Flanders Fields: The 1917 Campaign* (London: Longman, 1959). The books by Liddell Hart were *Reputations Ten Years After* (1928); *The Real War* (1930); *The War in Outline* (1936); and *Through the Fog of War* (1938).

²² J. F. C. Fuller, *The Conduct of War 1789–1961* (London: Eyre and Spottiswoode, 1961), pp. 160, 172–7.

called upon to conduct was challenged in 1963 by John Terraine, who argued that Haig had recognised that, with approximately equal opposing forces, and with no flanks to turn, there could be no easy victory on the Western Front.²³ While some military historians continue to regard Haig as tactically conservative, others argue that he was not as blind to technological innovation as his critics have suggested, even if he was reluctant to accept that the circumstances of the Western Front drastically limited the role of cavalry.²⁴ It would be easy to overlook the fact that the BEF and its commander were moving along a learning curve – that is, increasing efficiency by experience – when engaged in a novel form of warfare.

The British army had ample experience in the Boer War of how accurate rifle fire could inflict heavy casualties and bring a frontal attack to a halt, and the Russo-Japanese War had confirmed that modern artillery could be expected to be very effective against troops in the open.²⁵ Even before war ceased to be mobile in 1914, troops would dig impromptu fire pits. What was not anticipated was that the unprecedented size of the armies on the Western Front would make it possible to build and defend continuous series of trenches from the Channel to the Swiss border, or that rifles would be supplemented by machine guns in the ratio of 1 to every 20 infantry by 1918 compared with 1 to every 500 in 1914.

Successful attack in these conditions depended upon suppressing the defenders' fire, from artillery as well as machine guns, and required the massing of large numbers of guns: 18-pounders to cut wire entanglements, and howitzers and heavy guns to hit trenches and for counter-battery work. Mortars, which were well adapted to trench warfare, were

²³ John Terraine, *Douglas Haig: The Educated Soldier* (London: Hutchinson, 1963), pp. 481–2.

²⁴ For Haig's military conservatism, see Tim Travers, *The Killing Ground: The British Army, the Western Front and the Emergence of Modern Warfare, 1900–1918* (London: Allen and Unwin, 1987), chs. 4–7, and *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917–1918* (London: Routledge, 1992), esp. pp. 141, 179; Denis Winter, *Haig's Command: A Reassessment* (London: Viking, 1991), esp. pp. 162–6. For Haig's willingness to exploit new weapons and methods, see Michael Crawshaw, 'The impact of technology on the BEF and its commander', in Brian Bond and Nigel Cave (eds.), *Haig: A Reappraisal 70 Years On* (London: Leo Cooper, 1999), pp. 155–75, and Gary Sheffield, *Forgotten Victory. The First World War: Myths and Realities* (London: Headline Book Publishing, 2001), pp. 145–6, 261. For Haig's belief in the value of cavalry in modern warfare, see *The Private Papers of Douglas Haig 1914–1919*, ed. Robert Blake (London: Eyre and Spottiswoode, 1952), pp. 147, 212, 226, and *Sir Douglas Haig's Despatches*, ed. J. H. Boraston (London: J. M. Dent and Sons, 1920), pp. 327–8.

²⁵ Keith Neilson, '"That dangerous and difficult enterprise": British military thinking and the Russo-Japanese War', *War and Society*, 9 (1991), 17–37.

reintroduced in their modern form. Aircraft made a major contribution by identifying targets that were out of sight of the gunners. However, the attacker's guns had to be co-ordinated with the advancing infantry, no easy matter given the rudimentary communications available. The radio sets available were too bulky for troops to carry into battle, and telephone lines were vulnerable to being cut by the enemy's artillery. Most commonly messages were conveyed by runners, whose information might be overtaken by events before it reached the artillery. Indeed, lack of communication could lead to infantry being left to fight their own battle. For example, at the Battle of Loos on 25 September 1915 two brigades of the 15th (Scottish) Division broke through the German front line and took Hill 70, two-and-a-half miles beyond the British lines. Some men tried unsuccessfully to attack the German second line, with its unbroken wire; others tried to hold the hill against counter-attacks; all came under fire on two sides from field guns and machine guns, but had no means of calling for artillery support. The eight battalions involved sustained 4,312 casualties, over 50 per cent of their strength, in one day.²⁶

The British artillery began the war equipped largely with shrapnel, which exploded in the air, scattering metal fragments, and was best suited for open warfare, rather than the high-explosive shells that could destroy fixed defences. The supply of shells on the scale required by 1915 presented an unfamiliar problem. Although increased output was achieved by mass production using unskilled workers, large numbers of shells fired in 1915–16 failed to explode. However, by 1917–18 the quality of British munitions was high (French munitions production followed a similar learning curve).²⁷ A further problem was the time and effort required to take shells to the guns. At first this was done by horse-drawn wagons or road-bound mechanical transport from pre-existing railheads. The construction of light railways made it possible to bring a much greater volume of shells close to the front in all weathers, and the reorganisation of all aspects of British transportation in France by a businessman, Eric Geddes, after September 1916 was a pre-condition of the successful use of artillery in 1917–18.²⁸ Even so, shells employed in large quantities broke up the ground, making it difficult for the infantry to advance through mud. This effect could be avoided if the bombardment was brief and accurate, to give cover to the infantry, and

²⁶ Sir James Edmonds, *Military Operations France and Belgium 1915*, 2 vols. (London: Macmillan, 1928), vol. II, pp. 191–207.

²⁷ Trevor Wilson, *The Myriad Faces of War: Great Britain and the Great War, 1914–1918* (Cambridge: Polity Press, 1986), p. 218.

²⁸ Keith Grieves, *Sir Eric Geddes: Business and Government in War and Peace* (Manchester University Press, 1989), pp. 29–39.

also if it could be combined with other weapons to neutralise the enemy's defences.

One such weapon was gas, employed on the Western Front for the first time by the Germans at Ypres on 22 April 1915. Chlorine was released from cylinders and blown by the wind towards the Allied trenches. The effect was devastating on unprotected troops: 6,000 were killed, and men on the edge of the gas cloud fled, leaving a front of four miles almost deserted. However, primitive gas-masks were quickly improvised, and the Germans had the problem that the prevailing wind was from the west. The British first used gas at Loos on 25 September 1915, but with mixed success, according to the way the wind blew (in some cases back into the faces of the attackers). The introduction of the gas shell made it possible to cover selected targets with gas, but the science of making gas-masks kept pace with gases designed to attack the victim's breathing system. Only mustard gas, first used by the Germans on 11 July 1917, again at Ypres, proved to be impossible to counter satisfactorily as it combined an attack on the lungs, throat and eyes, with blistering of the skin. The scale of casualties, however, was limited by the fact that the effect of mustard gas was restricted to the immediate vicinity of the point where a shell landed. The Germans enjoyed the advantage of having more scientific personnel for research and development in chemical warfare and it took the British until September 1918 to make a large supply of mustard gas shells. These, however, were used to great effect that month in the successful assault on the Hindenburg Line.²⁹

Notwithstanding the emphasis placed on tanks by Churchill, Fuller and Liddell Hart, this notable British invention had its limitations. British tanks first went into action on 15 September 1916, only nine months after the trials of the first practical machine, and before the inevitable teething problems had been eliminated. French tanks were developed independently but did not see action for another seven months, and the first two types of *chars de combat* were inferior to the British Mark I in their ability to cross obstacles. The first German tanks did not appear in action until 1918 and again cross-country performance was poor. The British Mark I was prone to mechanical breakdowns, especially on broken ground, as on the Somme battlefield,

²⁹ A. M. Low, *Modern Armaments* (London: Scientific Book Club, 1939), pp. 108–16; Rolf-Dieter Müller, 'Total war as a result of new weapons? The use of chemical agents in World War I', in Roger Chickering and Stig Förster (eds.), *Great War, Total War: Combat and Mobilization on the Western Front, 1914–1918* (Cambridge University Press, 2000), pp. 95–111; Albert Palazzo, *Seeking Victory on the Western Front: The British Army and Chemical Warfare in World War I* (Lincoln: University of Nebraska Press, 2000), pp. 123, 185–7.

and of the forty-eight available on 15 September 1916 only twenty-one got within striking distance of the enemy. Conditions for the crew were close to intolerable in the absence of a satisfactory cooling and ventilation system. Nevertheless, Haig saw enough potential in the tank to place an order a month later for 1,000. The improved Mark IV enjoyed considerable success when employed in large numbers and on suitable terrain at Cambrai in November 1917, but that battle also demonstrated that tanks were vulnerable to artillery fire and required support from infantry and artillery if ground gained were to be held against counter-attacks. The Mark V of 1918 still had limited speed – 4 miles per hour (m.p.h.) maximum – and range – about half that of a Second World War tank – reflecting its role as an infantry support weapon rather than a machine designed to penetrate deep into enemy territory. The War Office had drawn up a specification in November 1916 for a faster, longer-range machine capable of co-operating with cavalry, and the result was the Medium Mark A of 1918 with a speed of 8.3 m.p.h. and a range of about 80 per cent of a Second World War tank. Even so, there was little scope for proto-blitzkrieg tactics. Tanks placed an enormous strain on the BEF's logistics. They required vast quantities of fuel, lubricants and spare parts, and could only operate close to standard-gauge railways, a major drawback once trench warfare gave way to more mobile operations during the German retreat in the summer and autumn of 1918.³⁰ In the light of experience, a report from the army's General Headquarters in France stressed the need for co-operation between tanks and other arms, but added prophetically that 'as the speed of tanks is developed, and their machinery perfected, it is possible that their tactical employment may develop and that their rôle may become more independent'.³¹

Recent research has shown that the key tactical and technological developments in 1917–18 related to the artillery. British artillery techniques in 1914 were designed to give mobile close support to the infantry and were ineffective against entrenched troops. In 1915–17 the artillery firepower was employed in increasing amounts, but with limited success, to destroy the enemy's fixed defences. However, in 1917–18

³⁰ D. J. Childs, *A Peripheral Weapon? The Production and Employment of British Tanks in the First World War* (Westport, Conn.: Greenwood, 1999), esp. pp. 115–17; J. P. Harris, *Men, Ideas and Tanks: British Military Thought and Armoured Forces, 1903–1939* (Manchester University Press, 1995). For Haig being keen from 1916 to use tanks, but also realising the need to work out tactics for them, see *Private Papers of Douglas Haig*, pp. 159, 162, 165, 167, 269.

³¹ *Tanks and Their Employment in Co-operation with Other Arms*, pamphlet issued by General Staff, August 1918, War Office records, series 158, file 832 (WO 158/832), TNA.

improved techniques made it possible for artillery to be used to neutralise the enemy, both by effective counter-battery fire and through the creeping barrage which kept defenders' heads down as the British infantry advanced. Accuracy was improved by reliable mapping and grid references based on both aerial and ground surveys; aerial and ground observation during the battle, including the location of enemy positions through flash-spotting and the new technique of sound-ranging; the provision of meteorological data on barometric pressure, temperature and wind, all of which affected the flight of shells; and measurement of individual guns' performance. The utility of this flow of information depended upon improved command and control systems. The crucial step was the creation in 1917 of a corps-level counter-battery system with staff dedicated to analysis and tactical application of intelligence. The failure of the Germans to do likewise placed their artillery at such a disadvantage that by the end of the war the British were able to suppress the German batteries' fire when attacking fixed positions. The lack of mobile radio limited the ability of the British artillery to react to events on the ground. Even so, British tanks could be protected from the enemy's guns during the assault on the enemy's trenches, and the fact that tanks could break through barbed wire and other obstacles released the artillery for counter-battery work.³² The British army enjoyed success in the summer and autumn of 1918 not because of any one particular weapon, but because it was learning to combine the different arms – artillery, infantry, tanks and aircraft – into a single system.

Air weapons and tactics³³

Britain was a major pioneer of air warfare. Radio equipment was first fitted to aircraft in September 1914, which facilitated co-operation with

³² Jonathan Bailey, 'British artillery in the Great War', in Paddy Griffiths (ed.), *British Fighting Methods in the Great War* (London: Frank Cass, 1996), pp. 23–49; Peter Chasseaud, 'Field survey in the salient: cartography and artillery survey in the Flanders operations in 1917', in Peter Liddle (ed.), *Passchendaele in Perspective: The Third Battle of Ypres* (London: Leo Cooper, 1997), pp. 117–40; Crawshaw, 'Impact of technology', pp. 162–4; Paddy Griffiths, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916–18* (New Haven: Yale University Press, 1994), pp. 142, 153–8; Roy MacLeod, 'Sight and sound on the Western Front: surveyors, scientists, and the "battlefield laboratory", 1915–1918', *War and Society*, 18 (2000), 23–46; Albert P. Palazzo, 'The British army's counter-battery staff office and control of the enemy in World War I', *Journal of Military History*, 63 (1999), 55–74.

³³ What follows is based mainly on Sir Walter Raleigh and H. A. Jones, *The War in the Air*, 6 vols. and vol. of appendices (Oxford: Clarendon Press, 1922–37) and Cooper, *Birth of Independent Air Power*, which is more critical of the air forces' achievements than the official history.

artillery, and the development of aerial photography made possible the accurate mapping of the enemy's positions. As early as February 1915 Haig praised 'the excellent photos' of the enemy positions obtained by aerial reconnaissance.³⁴ It was a logical step to arm some aircraft with machine guns to attack enemy reconnaissance aircraft. The problem of firing a machine gun through the propeller was first solved satisfactorily by the Germans, who used a device that interrupted the gun whenever a bullet would strike one of the blades. During the winter of 1915–16 Fokker aircraft thus equipped inflicted heavy losses on the RFC. The first British aircraft designed as fighters had a pusher engine, giving a clear field of fire to the gunner at the front in the case of two-seaters, or to a fixed machine gun in the case of the single-seat D.H.2. These machines were less aerodynamically efficient than those with engines at the front, but proved to be good enough when produced in larger numbers than the Fokkers to achieve air superiority in time for the Somme offensive in the summer of 1916. Aircraft of the period were so simple that new types could be developed within a few months and by the autumn of 1916 new German fighters, particularly the Albatros D.1, had an advantage over Allied machines. From late 1916 the British made increasing use of interrupter gear for machine guns and in the summer of 1917 new British designs, including the famous Sopwith Camel, restored the RFC's fortunes. With a maximum speed of about 120 m.p.h. the Camel was 30 per cent faster than the D.H.2.

Tactical air power was first used, in a small way, in support of the BEF as early as the Battle of Neuve Chapelle in March 1915. The RFC was told to impede the enemy's communications and, although the bombs then available were too small to do much damage to railway bridges and junctions, part of a train was destroyed. The then Major Hugh Trenchard, who was in command of the RFC 1st Wing in France, also claimed that three of his aircraft had dropped bombs on the village of Fournes and set fire to a house, which was reported to be the headquarters of a German division.³⁵ By the time of the Somme in 1916, tactical air power was employed systematically against enemy road and rail communications. Like cavalry, aircraft were not effective against fortified positions, but could be used in rearguard actions, as during the retreat of the British Fifth Army in the spring of 1918, and were especially valuable in pursuit of a retreating enemy, as on the Salonika front in September 1918.³⁶

³⁴ Sir Douglas Haig diary, 25 Feb. 1915, National Library of Scotland (NLS).

³⁵ Haig diary, 10 Mar. 1915.

³⁶ J. C. Slessor, *Air Power and Armies* (Oxford University Press, 1936), pp. 90–105.

The first recorded bombing raid on a city occurred on 13 August 1914, when a German machine dropped two four-pound bombs on a Paris suburb. Aircraft in 1914 had engines of only 70–100 horsepower (h.p.) but as engines of 250 h.p. or more were developed it became possible for aircraft to carry bombs each weighing 112 pounds (up to a total of 1,792 pounds in the case of the twin-engined Handley Page 0/400 of 1917). Strategic bombing can be traced, in Britain's case, to a raid by three small RNAS aircraft on Zeppelin sheds at Friedrichshaven in November 1914. However, it was not until the spring of 1917 that the RNAS received the Handley Page 0/400, and the RFC did not order these machines until the autumn of that year. Until that date British air raids on Germany were on a very small scale.

Meanwhile, Britain experienced air attacks by Zeppelins, beginning with a raid on East Anglia on 19 January 1915. By the standards of later wars, little damage was done, although the smallest Zeppelin could carry 3,000 pounds of bombs. Nevertheless, public opinion demanded countermeasures, and anti-aircraft guns, searchlights and aircraft were deployed. The Zeppelins relied on highly inflammable hydrogen gas to keep them aloft and were soon restricted to operating at night at altitudes from which accurate bombing was impossible. A number were brought down by defending aircraft from the autumn of 1916, leading the Germans to adopt heavier-than-air machines instead. The twin-engined Gotha carried only a 900-pound bomb load, but with a maximum speed of 87.5 m.p.h. was harder to locate or destroy than a Zeppelin. From May 1917, raids by day as well as by night by Gothas, supplemented by some four-engined Staakens with 2,200-pound bomb loads, forced the British to create an elaborate system of air defence for the London area, including sound-detectors, height-finders and barrage balloons, as well as more powerful searchlights and anti-aircraft guns, and more fighter aircraft. The keys to success were effective intelligence and command, control and communication systems. Signals intelligence provided forewarning of when enemy raiders were taking off and sometimes of their direction, if they used radio in flight. Sound-detectors on the coast gave further early warning and observers reported on the progress of raiders over land. Major-General Edward Ashmore, the commander of the London Defence Area in 1918, was able to plot enemy aircraft on a map at his headquarters. The main differences from the system used in 1940 were the absence of radar with which to detect the direction of enemy aircraft before they came within the limited range of coastal sound-detectors, and the lack of lightweight radios to enable fighter aircraft to receive directions from ground control. As a result there was heavy reliance on patrols and on average only 3 per cent of

fighters that took off intercepted an enemy. Even so, the defences took their toll and the Germans abandoned daylight raids. Finally, on the night of 19 May 1918, six of twenty-eight bombers were brought down, and four more crashed on landing owing to fog. Raids ceased thereafter because the German high command decided that the bombers could be put to better use on the Western Front.³⁷

Britain's main attempt at strategic bombing followed the creation in May 1918 of the Independent Air Force. Although this strike force was based in France, most targets were in German Lorraine or the Rhineland, as even the best bombers available lacked the range to reach the Ruhr. Moreover, whereas German bombers attacking England had a reasonable chance of escaping detection or interception until they crossed the coast, British bombers had to cross the enemy front line, and then occupied territory, where their movements could be reported by telephone. Heavy losses were suffered from German fighters during daylight raids, and heavy bombers like the Handley Page 0/400 tended to be used only at night, when accurate bombing was difficult. Fast, single-engined bombers could be operated by day, but the D.H.4's bomb load was only about one-third of the Handley Page 0/400, and the D.H.9's about a half. Nevertheless, the commander of the Independent Air Force, Trenchard, became convinced of the merits of strategic bombing. Early in November three new, four-engined Handley Page V/1500 machines were being prepared for a raid on Berlin, with reduced bomb loads to enable them to carry more fuel, but hostilities ceased before they could be used. The impact of both British and German air raids on industrial production was negligible, and civilian casualties were mercifully low compared with the Second World War: 746 deaths in Germany, and 1,414 in Britain. In the opinion of the official historian, H. A. Jones, the main effect of strategic bombing was that it forced the enemy to use resources for air defence that might otherwise have been deployed elsewhere.³⁸ Aerial reconnaissance and tactical operations in support of the army and air escorts for convoys were more significant for the defeat of Germany. Notwithstanding the creation of the RAF, aircraft were not yet able to offer an independent strategy as an alternative to land and naval warfare.

³⁷ John Ferris, '“Airbandit”: C3I and strategic air defence during the first Battle of Britain, 1915–18', in Michael Dockrill and David French (eds.), *Strategy and Intelligence: British Policy during the First World War* (London: Hambledon Press, 1996), pp. 23–66; Barry D. Powers, *Strategy Without Slide-Rule: British Air Strategy 1914–1939* (London: Croom Helm, 1976), pp. 14–74.

³⁸ Cooper, *Birth of Independent Air Power*, pp. 134–6, 138; Raleigh and Jones, *War in the Air*, vol. V, p. 153; vol. VI, p. 152.

War economy and finance

With the exception of major warships, the armaments available in 1914–18 were suitable for mass production, making war a gigantic industrial undertaking. Britain had the largest shipbuilding industry in the world, but even so it was difficult to meet the requirements of both the Royal Navy and the merchant navy when the latter was suffering heavy losses from submarines. British steel production in 1914 was only about half of Germany's, and domestic output had to be supplemented by imports from the United States and Sweden. Munitions production involved equipping new factories with machine tools, and once more the shortfall in British output had to be made good with imports, mainly from American sources.³⁹ The munitions requirements of the army, which increased in size from 734,000 men in August 1914 to a peak of 3,858,000 in March 1918 (or 5,560,000 if troops from the Empire are included),⁴⁰ were far beyond what the pre-war armaments industry could supply. New manufacturing capacity had to be created not only for guns and shells, but also for chemicals and optical glass, two sectors of industry where Britain had come to depend on imports from Germany before 1914. The Ministry of Munitions provided financial and technical assistance, and in 1916 the Department of Scientific and Industrial Research was created to promote research not only directly in universities and elsewhere but also indirectly by encouraging industries to set up research associations.⁴¹ Barnett is correct to point out that the war revealed the extent to which Britain had fallen behind other industrial countries in a range of advanced technologies, including aircraft engines, electrical goods and scientific instruments.⁴² On the other hand, it was normal in the international economy for countries to specialise in the production of some products and to rely upon imports for others. For example, in the cases of optical glass and scientific instruments, France had also become dependent upon imports from Germany for a range of specialist items, although France was a net exporter of optical glass and had pioneered the manufacture of scientific

³⁹ Ministry of Munitions, *History of the Ministry of Munitions*, 12 vols. (London: HMSO, 1921–2), vol. II, part 1, p. 58; vol. VII, part 2, pp. 1–2, 9, 19–20, 71, 78–9; vol. VIII, part 3, pp. 38–9, 50–1; vol. XII, part 1, p. 110.

⁴⁰ War Office, *Statistics of the Military Effort of the British Empire during the Great War 1914–20* (London: HMSO, 1922), pp. 30–7.

⁴¹ Roy and Kay MacLeod, 'War and economic development: government and the optical industry in Britain, 1914–18', in Winter (ed.), *War and Economic Development*, pp. 165–203.

⁴² Barnett, *Collapse of British Power*, pp. 83–9.

instruments.⁴³ Nor was British industry found wanting in every respect. Barnett draws attention to delays in tank production caused by poor quality of castings of track-links and a lack of engines, but once these difficulties were overcome heavy engineering firms were able to respond well to orders for tanks, the skills required being similar to those for producing railway locomotives. Whereas British tank production in 1916–18 totalled 2,619, design and industrial delays limited German output to 20, all in 1918.⁴⁴

The British aircraft industry in 1914 consisted of small firms with no experience of mass production, and had to expand to sustain an increase in first-line aircraft from 113 aeroplanes and 6 airships in August 1914 to 3,300 aeroplanes and 103 airships by November 1918, with an attrition rate on the Western Front that averaged 670 aeroplanes per month in 1918 owing to enemy action or accidents. Unplanned growth and competing orders by the War Office and Admiralty led to a situation in January 1917 in which the RFC and the RNAS between them used seventy-six different airframe designs and fifty-seven different types of engine. After the Ministry of Munitions took over procurement in December 1916 a policy of standardisation reduced the number of types in production by September 1917 to fourteen airframes and thirteen aero-engines, with a consequent increase in economies of scale and in output. Although problems in developing more powerful aero-engines and in introducing new types of aircraft into service led to production falling below targets, output of aircraft doubled from 14,832 in 1917 to 30,782 in 1918.⁴⁵ The British aircraft industry was not alone in encountering problems in developing more powerful aero-engines. Similar difficulties were experienced in Germany, and whereas the latest German fighters in 1918 used 180 h.p. engines, British designers were able to exploit the 230 h.p. Bentley Rotary 2. Likewise, whereas the Gotha bombers had 260 h.p. engines, Handley Page bombers had the 360 h.p. Rolls-Royce Eagle VIII. Over the war as a whole, as table 2.1 shows, British output of airframes exceeded German output. The Germans were unable to take full advantage of the superiority of their Fokker fighter in 1915 because they failed to manufacture it in large

⁴³ Mari E. W. Williams, *The Precision Makers: A History of the Instruments Industry in Britain and France, 1870–1939* (London: Routledge, 1994), pp. 72–8.

⁴⁴ Barnett, *Collapse of British Power*, pp. 84, 86; Childs, *Peripheral Weapon?* pp. 34–5; Ministry of Munitions, *History of the Ministry of Munitions*, vol. XII, part 3, pp. 49–50, 58, 62–9, 93; B. T. White, *German Tanks and Armoured Vehicles 1914–1945* (London: Ian Allan, 1966), p. 22.

⁴⁵ Cooper, *Birth of Independent Air Power*, pp. 87, 90–3, 142. For the airframe and aero-engine industry, see Peter Fearon, ‘The formative years of the British aircraft industry, 1913–1924’, *Business History Review*, 43 (1969), 476–95.

Table 2.1. *Aircraft production, 1914–18*

	Great Britain	France	Germany
Airframes	55,093	67,982	47,637
Aero-engines	41,034	85,317	40,449

Source: Raleigh and Jones, *The War in the Air*, vol. of appendices, p. 154.

numbers, monthly output never exceeding thirty-six. In 1917–18 the German industry likewise lacked the resources to produce Gothas in quantity.⁴⁶ As table 2.1 shows, British output of aero-engines lagged behind that of France, but this shortcoming could be made up by imports: 16,987 of the engines required for British airframes (or 29 per cent of the total procured) were acquired in this way.

The crucial decisions regarding the scale of Britain's war effort came in two stages. First, Kitchener was allowed in August 1914 to recruit a mass army of volunteers, without a clear idea of how big it would become or any economic analysis of what would be required to maintain a force of a given size over the period of three years that Kitchener expected the war to last. The government's economic policy in 1914–15, as articulated by the President of the Board of Trade, Walter Runciman, was that war should interfere with trade and industry as little as possible, so that Britain could support its allies with loans or subsidies and by supplying munitions. It was only after August 1915, by which time Kitchener had decided to raise the army's establishment to seventy divisions – a force that could be sustained only by conscription – that ministerial committees discussed what kind of war Britain should wage. McKenna, the chancellor of the exchequer, and Runciman, argued that, if more men were taken from industry, Britain would be unable to produce either munitions for her allies or the exports needed to pay for essential imports. McKenna believed that Britain could wage war for ten years, if industry were left alone, but that conscription would lead to national bankruptcy. On the other hand, Lloyd George, now minister of munitions, believed that an enlarged army was necessary to prevent defeat, and hoped that victory could be won before the end of 1916, before bankruptcy intervened.⁴⁷

⁴⁶ For the German aircraft industry's problems, see J. H. Morrow, *German Air Power in World War I* (Lincoln: University of Nebraska Press, 1982).

⁴⁷ French, *British Economic and Strategic Planning*, pp. 51, 64, 110–13, 126–32; David French, *British Strategy and War Aims 1914–1916* (London: Allen and Unwin, 1986), pp. 116–22, 129–31; Gilbert, *David Lloyd George, 1912–1916*, pp. 226–30.

On this occasion, an economist was involved: John Maynard Keynes, who had been recruited from Cambridge to serve as a Treasury official, provided a brief on 23 August 1915 for the Chancellor, in which he argued that, with the British economy at full employment, any diversion of manpower to the army would be an alternative, and not additional, to subsidies. He reckoned that the current level of subsidies to France represented the output of 500,000 men, and those to Italy the output of 1 million men.⁴⁸ Keynes' calculations were not flawless, as they made no allowance for the possibilities of increasing productivity as output rose and as restrictive practices were abandoned, or of releasing men from industry by employing women. Nevertheless in broad terms he was correct, in that Britain later became dependent financially upon the United States. His arguments seem to have had little impact on ministers' deliberations. A Committee on War Policy, chaired by Crewe, took the view in September 1915 that it was unlikely that the British government's credit, and therefore its ability to borrow in America, would collapse so completely as to force the country to withdraw from the war. In February 1916, Asquith, Austen Chamberlain (the Unionist secretary of state for India) and McKenna, forming the Cabinet Committee on the Co-ordination of Military and Financial Effort, concluded that it would be possible to place an army of sixty-two divisions in the field, with three months' reserves, plus five divisions at home, without reserves, but only at the cost of some disruption of export trades and by adopting financial expedients that could only be sustained for a short period. In agreeing to this scale of military effort, ministers were gambling on early victory, and were also moving inexorably towards conscription, as only thereby could the 'wastage' (casualties) in such a large force be replaced. The first Compulsory Service Act came into force on 2 March 1916.⁴⁹

The most pressing problem early in the war was the supply of shells. The British, like the French and Germans, had not anticipated the rate of consumption reached in the first two months of the war and in subsequent battles. Historians long took Lloyd George at his own estimation as the man who solved the problem by bringing businessmen

⁴⁸ J. M. Keynes, 'The alternatives', 23 Aug. 1915, reprinted in *Collected Writings of John Maynard Keynes*, 30 vols., ed. Elizabeth Johnson and Donald Moggridge (London: Macmillan, and Cambridge University Press, 1971–82), vol. XVI, pp. 110–15.

⁴⁹ 'War policy: report', 6 Sep. 1915, CAB 27/2, and 'Report of Cabinet Committee on the Co-ordination of Military and Financial Effort', 4 Feb. 1916, CAB 27/4, TNA. For McKenna's failure to persuade his Cabinet colleagues to relate strategy to what the national finances would sustain in a long war, see Martin Farr, 'A compelling case for voluntarism: Britain's alternative strategy, 1915–1916', *War in History*, 9 (2002), 279–306.

with their entrepreneurial skills into a new Ministry of Munitions, which he headed. More modern research has shown that the great increase in output in 1915 and 1916 was largely the result of initiatives taken earlier by Kitchener. The War Office placed contracts in 1914–15 that were greater than the established arms firms could fulfil, which encouraged them to enlarge their own plant and to subcontract to firms not hitherto engaged on armaments work. Kitchener was willing to bring in businessmen to help organise supplies, taking advice from Allan Smith, secretary of the Engineering Employers' Federation, Sir Percy Girouard, managing director of the Armstrong works at Elswick, and George Macaulay Booth, a Liverpool shipowner. Under their guidance, munitions contracts were spread widely to engineering firms, which were encouraged to pool resources on a regional basis. Deliveries increased from 2 million shells in the eleven months to the end of June 1915 to 14.5 million shells in the six months to the end of December 1915; of the latter, 11.8 million were the result of orders placed by the War Office and only 2.7 million by the Ministry of Munitions. Allowing for the inevitable lag between orders and production, these figures suggest that Lloyd George was not wholly responsible for the increase. While his dynamism did make a difference, the broad outlines of munitions production had been established before the creation of the Ministry of Munitions.⁵⁰

The key factor of production was labour, especially skilled labour. Reliance on uncontrolled voluntary recruitment to the army led to a loss of 20 per cent of the male labour force in manufacturing and mining by July 1915, a proportion that rose with conscription to 45 per cent by July 1918.⁵¹ Within these broad figures were losses by May 1915 in industries directly concerned with war production: shipbuilding 16.5 per cent, iron and steel 18.8 per cent, small-arms manufacturers 16 per cent, and chemicals and explosives 23.8 per cent.⁵² Early in 1915 the War Office began to release skilled men who had enlisted, and those engaged in arms production were issued with badges to free them from popular pressure to volunteer. The labour shortage could only be overcome, however, by breaking work processes hitherto done by skilled workers into simple stages that semi-skilled or unskilled workers could

⁵⁰ Hew Strachan, *The First World War*, vol. I: *To Arms* (Oxford University Press, 2001), pp. 993–8, 1067–71; Chris Wrigley, 'The Ministry of Munitions: an innovative department', in Burk (ed.), *War and the State*, pp. 32–56.

⁵¹ P. E. Dewey, 'Military recruiting and the British labour force during the First World War', *Historical Journal*, 27 (1984), 199–223, at 204.

⁵² R. J. Q. Adams, *Arms and the Wizard: Lloyd George and the Ministry of Munitions* (London: Cassel, 1978), p. 72.

cope with, a development known as 'dilution'. By this means almost 2.5 million workers were absorbed into the industrial labour force between the outbreak of war and July 1918, not far short of the figure of 2.8 million men from industrial occupations who enlisted. Some 31 per cent of the new industrial workers were women but the majority were men drawn from non-industrial occupations.⁵³ By 1918 the mobilisation of manpower in Great Britain had gone as far as it could without adversely affecting the output of essential industries, and shipbuilding and coal-mining had to be protected from the demands of the army for recruits.⁵⁴ Changes in work practices were not without difficulties in industrial relations, and in March 1915 Lloyd George, still chancellor of the exchequer, negotiated the so-called 'Treasury agreement' with trade union leaders whereby there would be dilution and compulsory arbitration to avoid strikes for the duration of the war, in return for restriction of profits on munitions contracts.

Profits were essential to encourage firms to switch to munitions work, given that Britain was still a capitalist, and not a command, economy, notwithstanding extensive powers granted to the government under Defence of the Realm Acts from 1914, which were used, for example, to requisition the output of jute sacking required for sandbags, or the Munitions of War Act of July 1915, which gave legal force to the Treasury agreement. Under the Munitions of War Act profits of munitions firms were limited to a standard rate – normally the average of the net profits of the last two pre-war years – plus 20 per cent, the balance being paid to the Treasury as munitions levy. In September 1915 an excess profits duty was imposed on all firms whose profits exceeded their pre-war income-tax assessment, the rate being initially 50 per cent, but raised to 60 per cent in 1916 and 80 per cent in 1917. However, the Ministry of Munitions and the Inland Revenue were not given powers to inspect firms' books, and businessmen were generally able to charge prices that left them with the same profits as they would have had if taxes on profits had not existed.⁵⁵ High prices were acceptable to the Ministry of Munitions since its primary concern was with production, and in the absence of balanced budgets there was no restraint on its expenditure.

⁵³ Jon Lawrence, 'The First World War and its aftermath', in Paul Johnson (ed.), *Twentieth-Century Britain: Economic, Social and Cultural Change* (London: Longman, 1994), pp. 151–68, at p. 158.

⁵⁴ Keith Grieves, 'Lloyd George and the management of the British war economy', in Chickering and Förster (eds.), *Great War, Total War*, pp. 369–87.

⁵⁵ Sir Josiah Stamp, *Taxation during the War* (Oxford University Press, 1932), p. 216.

Lloyd George did not take the advice of Treasury officials in 1914 to rely as much as possible on taxation to pay for the war. Theo Balderston has estimated that the annual average rate of borrowing between 1914/15 and 1918/19 was 57.3 per cent of national income in 1913, not much lower than the corresponding figure of 62.0 per cent for the Reich and the states in Germany. However, Britain was able to escape some of the worst inflationary effects of deficit finance because of the greater willingness of money markets to hold British securities compared with German securities.⁵⁶ Even so, retail prices doubled in Britain during the war. There was no shortage of cash, because the Treasury printed new currency notes in whatever quantities were required by the joint-stock banks and their customers. Monetary inflation began when the government borrowed from the Bank of England on ways and means advances and used them to pay contractors and creditors by cheque. Once the cheques were cleared, the joint-stock banks found that their holdings of cash at the Bank of England and their liabilities to depositors had increased in equal amounts. It was unprofitable for the banks to hold cash reserves of more than a fraction of their liabilities, and collectively they were willing to lend to their customers or the government sums of several times the original amount that the government had borrowed from the Bank of England. Money lent to the government would be spent by it, and would then return to the banks, and would be lent again.

As the Permanent Secretary of the Treasury, Sir John Bradbury, told the Cabinet in March 1915, the problem of war finance was how to adjust production and consumption so as to maintain essential supplies for the civilian population, while securing the largest possible proportion of output for the government. Consumer spending could be reduced either by taxation or by rising prices. (In an era before large-scale consumer credit it was assumed that interest rates acted only on investment.) Direct taxation was increased in stages: the standard rate of income tax from 1s 2d (5.8p) in 1913/14 to 6s (30p) in 1918/19, and the top rate of income tax plus supertax from 1s 8d (8.3p) to 10s 6d (52.5p) over the same period; but direct taxation of the working classes, who had been below the income-tax threshold before the war, proved to be difficult both politically and administratively. The Treasury thus came to rely on inflation rather than taxation to curb consumption.⁵⁷ With

⁵⁶ T. Balderston, 'War finance in Britain and Germany, 1914–1918', *Economic History Review*, 42 (1989), 222–44.

⁵⁷ Martin Daunton, *Just Taxes: The Politics of Taxation in Britain 1914–1979* (Cambridge University Press, 2002), pp. 38–49; Peden, *Treasury and British Public Policy*, pp. 83–95; R. C. Whiting, 'Taxation and the working class, 1915–24', *Historical Journal*, 33 (1990), 895–916.

Table 2.2. *GDP and government and consumers' shares of GDP, 1913–20*

Calendar year	Index of GDP at constant factor cost	Central government expenditure as percentage of GDP	Index of consumers' expenditure
1913	100.0	7.5	100.0
1914	101.0	13.2	100.5
1915	109.1	38.6	102.6
1916	111.5	44.2	94.1
1917	112.5	45.7	86.7
1918	113.2	44.7	85.9
1919	100.9	27.8	98.3
1920	94.8	17.6	98.5

Source: C.H. Feinstein, *National Income, Expenditure and Output of the United Kingdom, 1855–1965* (Cambridge University Press, 1972), tables 4, 7 and 12.

so much money in the hands of the commercial banks the Bank of England's conventional method of discouraging bank lending, by raising Bank rate, was ineffective. The rate of interest was determined by what was necessary to persuade the banks to hold their reserves in the form of short-term (three to twelve months) Treasury bills, peaking at 5.58 per cent for three-month bills in 1916. Private investment was discouraged by requiring Treasury approval from 1915 for new capital issues on the stock exchange. Domestic issues fell to a very low level, and most foreign issues were war loans for allies.⁵⁸

Table 2.2 shows that an increasing share of national output did go to the government. More regular employment and the ability of trade unions to demand higher wages initially benefited the working classes, but the average consumer's expenditure fell in real terms after 1915. Industrial relations deteriorated, as workers claimed wage increases to keep up with prices, or became more willing to listen to radical shop stewards who articulated their grievances.⁵⁹ Despite the problems of dilution, fewer working days were lost through strikes in 1915 and 1916 compared with 1914, but between 1916 and 1917 the total rose from about 2.5 million to nearly 6 million.⁶⁰ The creation of a Ministry of Labour out of the Board of Trade's Labour Department at the end of 1916 was in recognition of the importance of industrial relations in

⁵⁸ E. V. Morgan, *Studies in British Financial Policy 1914–1925* (London: Macmillan, 1952), pp. 143, 153, 263–5.

⁵⁹ James Hinton, *The First Shop Stewards' Movement* (London: Allen and Unwin, 1973).

⁶⁰ Department of Employment and Productivity, *British Labour Statistics: Historical Abstract 1886–1968* (London: HMSO, 1971), p. 396.

Table 2.3. *Balance of payments on current account, 1914–18*

	Visible trade balance (£m.)	Invisible trade balance (£m.)	Government payments abroad (net) (£m.) ^a	Current balance (£m.)
1914	-170	+315	-20	+125
1915	-368	+395	-50	-23
1916	-345	+520	-50	+125
1917	-467	+575	-80	+28
1918	-784	+580	0	-204

Note: ^a Expenditure by armed forces in countries where they were operating, *plus* expenditure in other countries (mainly the United States) on supplies shipped direct to armies and therefore not included in the trade returns, *minus* gifts from abroad from 1914, *minus* expenditure of American troops in Britain in 1917–18.

Source: Morgan, *British Financial Policy*, p. 341. © Palgrave Macmillan.

maintaining war production.⁶¹ Discontent over food prices and shortages was tackled by another new ministry, the Ministry of Food, which eventually introduced a bread subsidy in the autumn of 1917 and rationing in 1918. A new Food Production Department of the Board of Agriculture was given powers in 1917 to require farmers to plough grassland so as to increase the output of grains and potatoes. Nevertheless, grain imports continued to be necessary. State control of international purchases from 1916 and co-ordination of Allied purchases and shipping in 1917–18 helped to keep the rise in world prices within reasonable bounds.⁶²

Munitions orders placed with British firms diverted output from exports. Orders placed abroad likewise contributed to a deteriorating balance between imports and exports of goods (the visible trade balance). However, invisible exports from services increased in value, mainly due to increased earnings by shipping companies as freight rates rose. Even taking into account expenditure abroad by the armed forces, Britain managed an overall surplus on its current external payments down to 1917 (see table 2.3). Within this broadly satisfactory position, there was the problem of finding dollars with which to finance purchases in the United States. As table 2.4 shows, the British government borrowed large sums abroad (mainly from American private investors

⁶¹ In the event the simultaneous creation by Lloyd George of a Ministry of Labour and a Ministry of National Service confused manpower and industrial relations policy; see Rodney Lowe, 'The Ministry of Labour, 1916–1919: a still, small voice?', in Burk (ed.), *War and the State*, pp. 108–34.

⁶² Kathleen Burk, 'Wheat and the state during the First World War', in Dockrill and French (eds.), *Strategy and Intelligence*, pp. 119–38.

Table 2.4. *Balance of payments on capital account, 1914–18*

	Government loans to allies, etc. (£m.)	Government borrowing abroad (£m.)	Net decrease (+) or increase (–) in private investment abroad (£m.)	Net export (+) or import (–) of gold and silver (£m.)	Net decrease (+) or increase (–) in short-term credits (£m.)
1914	0	0	–144	–51	+70
1915	–298	+53	–17	+11	+274
1916	–530	+319	+104	+10	–28
1917	–563	+532	+57	+3	–57
1918	–297	+381	+13	–9	+116

Source: Morgan, *British Financial Policy*, p. 341. © Palgrave Macmillan.

down to the United States' entry into the war, and then from the American government). Dollar securities held by British subjects were requisitioned and sold or used as security for loans, and some gold was shipped across the Atlantic. Even so, the Treasury was able in November 1915 to predict, accurately, that Britain would exhaust her gold and dollar reserves early in 1917.⁶³

The strain on the sterling:dollar exchange rate reflected not only Britain's requirements for imports (themselves largely the result of the enlargement of the army) but also the fact that she carried out her traditional function of paymaster of the coalition. Britain's financial strength meant that she could raise loans in New York on more favourable terms than Russia or her other allies, apart from France, and even France had exhausted her credit in New York by May 1916. Britain therefore borrowed in New York, and then extended credits to her allies to enable them to obtain American supplies.⁶⁴ As table 2.4 shows, Britain's loans and subsidies to her allies exceeded her borrowing abroad except in 1918, after Russia had withdrawn from the war and when the United States had taken over responsibility for lending all dollars required for purchases in America. These transactions weakened Britain's financial strength after the war: Britain received no repayment at all from Russia and very little from France and the other Allies, but the United States expected war debts to be repaid in full.

Financial relations with the United States were crucial to the Allied war effort. The first British orders were placed in October 1914; the first

⁶³ Peden, *Treasury and British Public Policy*, p. 106.

⁶⁴ Kathleen Burk, *Britain, America and the Sinews of War, 1914–1918* (London: Allen and Unwin, 1985).

loan was raised from private sources through the New York bank of Morgan's, which acted as the British government's agent, in July 1915. In the autumn of 1916 the British blockade, involving as it did the blacklisting of American firms trading with Germany, led to Congress threatening reprisals. The Foreign Office convened an interdepartmental committee to consider how far Britain was dependent commercially and financially on the United States. Keynes told the committee in October that of the £5 million which had to be found daily for the prosecution of the war, about £2 million had to be found in North America (chiefly the United States, but also Canada) and that in future about four-fifths of this sum would have to be borrowed. He warned that a statement from the American government disapproving such loans would make it impossible to raise the necessary dollars, and advised that 'the policy of this country towards the USA should be so directed as not only to avoid any form of reprisal or active irritation but also to conciliate and to please'.⁶⁵ As it happened, following a statement by Morgan's that short-term British Treasury bills would be issued to American banks without limit, the Federal Reserve Board warned American investors in November to be careful about buying British government bonds. The Board had consulted President Wilson, who had stiffened the warning, as a means of bringing diplomatic pressure to bear on the Allies at a time when he was seeking to mediate between them and the Central Powers. The warning led to a temporary fall in the British government's credit in New York, and a sterling crisis.

Fortunately for the British, the Federal Reserve Board was persuaded to modify its warning after the American government had broken off diplomatic relations with Germany on 3 February 1917 on account of the latter's submarine campaign. Even so, by mid-March the Treasury had little more than a month's reserves of gold and dollars in New York with which to meet its commitments. After the United States declared war on Germany on 2 April the American government took over the responsibility for financing purchases for the Allies, but was only persuaded to lend money to support the sterling:dollar exchange rate after a further sterling crisis in July 1917. Niall Ferguson believes that the importance of American money to the Allied war effort has been exaggerated, given that Britain lent more to its allies than the United States lent to Britain, but he does not explain how Britain's financial strength would have enabled her to purchase supplies in North America

⁶⁵ J. M. Keynes, 'The financial dependence of the United Kingdom on the United States of America', 10 Oct. 1916, reprinted in *Collected Writings of John Maynard Keynes*, vol. XVI, pp. 197–8.

without borrowing dollars, especially once the balance of payments on current account moved into deficit in 1918.⁶⁶ Britain became wholly dependent on the United States government for dollars in the course of 1917–18. In the absence of American loans, the sterling:dollar exchange rate would have depreciated, making imports of munitions, food and oil from dollar sources more expensive, and forcing Britain to exhaust her limited dollar resources more quickly or to employ scarce shipping to import from more distant sources, such as Australia or India, where sterling would be accepted. Either way, Britain's war effort would have fallen below the level achieved in 1917–18, although by how much it is impossible to say.

Naval strategy

In the circumstances, a blockade had to be applied with discretion, notwithstanding the Royal Navy's command of the sea. American tolerance of British interference with neutral shipping was initially linked to the provisions of the Declaration of London (see pp. 44–5), but became greater once American business profited from Allied orders and Germany alienated American opinion by resorting to submarine warfare. It is best, therefore, to follow British naval strategy as interaction between command of the sea, protection of British shipping, and the waging of economic warfare on Germany.

German hopes that the Royal Navy's superiority in numbers over the High Seas Fleet could be eroded by a war of attrition, using mines, submarines and surface torpedo-craft, were disappointed by the British strategy of a distant blockade. British light cruisers and battle-cruisers did appear in force in the Heligoland Bight on 28 August 1914, when they sank three German light cruisers and a destroyer without loss. However, thereafter Jellicoe, the commander of the Grand Fleet, kept his capital ships well clear of the German coast. Signals intelligence enabled him to respond to sorties by the High Seas Fleet. An attempted raid by three German battle-cruisers and an armoured cruiser in the Dogger Bank area on 24 January 1915 was intercepted by British battle-cruisers for this reason and the armoured cruiser *Bluecher* was sunk. The only major fleet action was the Battle of Jutland on 31 May 1916, when Admiral Reinhold von Scheer attempted to inflict losses on Admiral David Beatty's force of battle-cruisers and fast battleships by luring it into a pursuit of German battle-cruisers until it ran into a line of U-boats

⁶⁶ Niall Ferguson, 'How (not) to pay for the war: traditional finance and "total" war', in Chickering and Förster (eds.), *Great War, Total War*, pp. 409–34, at p. 423.

supported by the High Seas Fleet. The U-boats played no part in the action and, while in pursuit of Beatty's ships, von Scheer ran into the Grand Fleet and escaped only because Jellicoe chose not to risk a night action when the danger from torpedoes would be greatest. Jellicoe's caution was reasonable because he was, as Churchill remarked, 'the only man on either side who could lose the war in an afternoon'.⁶⁷ The British suffered heavier losses than the Germans – three battle-cruisers, three armoured cruisers and eight destroyers, compared with one battle-cruiser, one pre-dreadnought battleship, four light cruisers and five destroyers – but retained a numerical superiority that ensured the Germans could not break the distant blockade. The battle illustrated the shortcomings of Fisher's concept of the battle-cruiser as a lightly armoured, big-gun vessel. As Beatty memorably remarked after two of his six battle-cruisers had been sunk early in the action, 'something is wrong with our bloody ships today'.⁶⁸ British ships were vulnerable to explosions because cordite was handled in bags, whereas the Germans used canisters and cartridge cases. However, after Jutland it was decided to increase substantially the armour provided for the battle-cruiser *Hood*, then under construction.

The threat to British trade from German surface ships was quickly dealt with, there being no German cruisers left on the high seas within eight months of the outbreak of war. In August 1914 in the Mediterranean the battle-cruiser *Goeben* and the light cruiser *Breslau*, evaded British warships and took refuge in Turkish waters. The next most powerful German force overseas was Vice-Admiral Graf von Spee's squadron of two armoured and three light cruisers in the Far East. Von Spee prudently evaded the Japanese navy and crossed the Pacific to operate against British shipping off South America, while dispatching one of his light cruisers, the *Emden*, to the Indian Ocean. As a result of the Royal Navy's strategy of concentrating its best warships in home waters, the British South American squadron under Rear-Admiral Christopher Craddock had only two old armoured cruisers, a light cruiser, an armed merchantman, and a slow pre-dreadnought battleship. Craddock chose to attack von Spee with his cruisers, and lost both armoured cruisers and his life at the Battle of Coronel on 1 November 1914. This blow to British prestige was speedily revenged by the dispatch of two battle-cruisers under Vice-Admiral Sturdee to the Falkland Islands, where they were joined by other British cruisers. At

⁶⁷ Churchill, *World Crisis: 1916–1918*, part 1, p. 112.

⁶⁸ Andrew Gordon, *The Rules of the Game: Jutland and British Naval Command* (London: John Murray, 1996), p. 120.

the Battle of the Falklands on 8 December, von Spee was outgunned and all of his squadron was sunk, except the light cruiser *Dresden*, which was subsequently scuttled. If Jutland exposed the limitations of the battle-cruiser concept, the Falklands illustrated its strength as a fast capital ship capable of protecting distant interests.

Meanwhile, the *Emden* had been highly successful, sinking sixteen British merchant ships and also, in a raid on the British port of Penang, a Russian cruiser and a French destroyer, before being sunk by the Australian cruiser *Sydney*. The *Emden* had some influence on Admiralty thinking on cruiser warfare as late as the 1930s. However, the other isolated German raiders were much less successful. The totals of merchant ships sunk in 1914 by the light cruisers *Karlsruhe* and *Koenigsberg* were fifteen and one respectively, and those of the armed liners *Kaiser Wilhelm der Grosse* and *Cap Trafalgar* were two and nil respectively. The *Karlsruhe* sank after an internal explosion and the *Koenigsberg* was blockaded in the Rufiji River in German East Africa, where it was destroyed by British monitors in the following year. The armed liners were intercepted and sunk while coaling, suggesting that the lack of secure bases was the fundamental reason why German surface raiders had little impact on British trade. The Germans had some success between December 1915 and February 1918 with cruises undertaken by small converted merchant ships; three of them, the *Moewe*, the *Wolf* and the *Seeadler* accounted for fifty-six Allied ships between them, besides those sunk by mines laid by them. However, two other such raiders achieved no success before being sunk, and the Germans did not persist with these operations. Nevertheless, the Admiralty devoted many ships to the search for surface raiders. Indeed the Admiralty's strategy of patrolling trade routes and stationing additional cruisers at focal points, rather than organising convoys with escorts, probably accounts for the cruiser shortage that Marder attributed to Fisher's pre-war policy of scrapping ships that were too old to fight and too slow to run away. The sinking of the British cruiser *Pegasus* (completed 1898) when it confronted the *Koenigsberg* (1907) in September 1914, and the losses of Craddock's *Good Hope* (1902) and *Monmouth* (1903) at Coronel to von Spee's *Scharnhorst* and *Gneisenau* (both 1907), could be attributed to a number of causes, but a common factor was rapid obsolescence brought about by international competition in warship design. Retention of even older cruisers would have exposed the Royal Navy to further such losses.

Cruisers were required to impose the blockade of Germany, although much of the work of boarding and checking merchant ships in northern waters was done by auxiliary armed boarding vessels. Indeed, the Tenth Cruiser Squadron patrolling the waters between Scotland and Norway

provides another example of the limitations of older ships retained by the Admiralty. The squadron's eight 'Edgar'-class cruisers (completed in 1893 or 1894) were not up to the strain of working in the heavy seas encountered in the area and were withdrawn after less than four months, to be replaced by armed merchant cruisers. German merchant ships quickly disappeared from the high seas, but the political problems of regulating neutral trade with Germany remained.

Although the British government had not ratified the Declaration of London, it hesitated to impose an unrestricted blockade, for fear of neutral, and particularly American, opinion.⁶⁹ Policy was devised jointly by the Foreign Office, the Board of Trade and the Admiralty until the creation of a Ministry of Blockade in February 1916. An order in council on 20 August 1914 stated that the Declaration of London would be observed with certain exceptions, notably that conditional contraband (food and clothing) intended for the use of the enemy would be liable to capture, regardless of the port to which a neutral was bound. Ships' papers were to be examined for evidence of the cargo's ultimate destination and the cargo could be detained until the neutral government concerned gave an assurance that the goods would not be re-exported to an enemy power. Using the spurious pretext that all food supplies in Germany were under government control, the British were able to impose the beginnings of the 'hunger blockade'. However, according to the terms of the Declaration of London, Germany was still free to import non-contraband raw materials, such as cotton, which was used for smokeless explosives, provided they were carried by neutral ships. A large part of the American cotton crop of 1914 went to Germany, but hostilities were not then expected to last long and the British authorities felt that the trouble that would be caused in the United States by declaring cotton to be contraband was not worthwhile. It was not until October 1914 that copper, iron ore and rubber were declared to be contraband, and cotton was not added to the list until August 1915, by which time Allied munitions contracts ensured that the loss of the German market would not be felt in America.

Meanwhile, the Allies had been given the opportunity to tighten the blockade by invoking their right of reprisal against German submarine attacks. The first British merchant ships had been sunk by U-boats in October 1914. At first there were few incidents and U-boat captains gave crews warning to take to their lifeboats. However, on 4 February

⁶⁹ What follows is based largely on A. C. Bell, *The Blockade of the Central Powers 1914–1918* (London: HMSO, 1961), originally printed in 1937 for official purposes only; and Eric Osborne, *Britain's Economic Blockade of Germany 1914–1919* (London: Frank Cass, 2004).

1915 the German government gave notice that the waters around the British Isles would be treated as a war zone in which every merchant ship encountered would be sunk, without it always being possible to ensure the safety of passengers and crew. The effect on neutral opinion was adverse, for whereas Allied blockade measures involved property and could be contested in prize courts, a submarine blockade frequently led to the loss of life. The British felt able to issue an order in council on 11 March 1915 prohibiting any merchant ship from sailing to or from any German port, and claiming the right to confiscate any enemy goods even if a merchant ship had left a neutral port. It was not possible to enforce this prohibition in the Baltic, but a series of agreements were negotiated with neutral countries adjacent to Germany whereby they promised not to re-export imported contraband goods.

When the Germans undertook what is usually called the first 'unrestricted submarine warfare' campaign in the spring of 1915 they had only about twenty-five U-boats available to enforce their blockade, or an average of six at sea each day. Moreover, the campaign was not in fact unrestricted. In response to a warning from the United States that Germany would be held accountable for any American ships or lives lost, the German government announced that submarine commanders would be ordered not to attack neutral ships, provided that they could be recognised as such. After American lives were lost when a U-boat sank the British liner *Lusitania* on 7 May, the Germans undertook not to attack passenger ships. The arming of merchant ships and the use of Q-ships, decoys disguised to look like harmless tramp steamers but carrying concealed guns, made it hazardous for U-boat commanders to surface to sink smaller ships with their guns and forced them to use their limited supply of torpedoes, which they would have preferred to keep for bigger targets. As it happened, for twelve months from September 1915, apart from a brief period in the spring of 1916, the Germans restricted operations to avoid incidents involving Americans. An attempt to tighten the submarine blockade in the spring of 1916 resulted in the loss of more American lives when the French cross-Channel steamer *Sussex* was torpedoed on 24 March 1916, and a month later the submarine campaign against British trade was suspended.⁷⁰

Nevertheless the increase in U-boat activity in 1916 made it easier for the British to stiffen their blockade. An order in council on 30 March made contraband liable to capture if found on a neutral vessel bound for a neutral port but destined for the enemy; another order on 7 July

⁷⁰ Paul G. Halpern, *Naval History of World War I* (London: UCL Press, 1994), pp. 291–308.

removed the remainder of the restrictions imposed by the Declaration of London. Hostile destination of contraband cargoes was presumed to exist until the contrary was shown. A vessel carrying contraband was liable to capture if the contraband formed over half the cargo. Moreover, at the end of February the leading German and Austro-Hungarian agents in Scandinavia, Holland, Portugal, Spain and Greece were put on blacklists, and all consignments to these persons or firms were liable to capture. Finally, in July, the British published a blacklist of neutral firms (including certain American companies) that were suspected of dealing with the Central Powers and with whom they forbade British firms to do business, denying them access to British coal and shipping. As noted above (p. 77), this step led to a deterioration in Anglo-American relations that was healed only after the United States broke off diplomatic relations with Germany. By July 1916 the blockade had probably been tightened as much as neutral opinion would tolerate, and was beginning to inflict real damage on the German economy at a time when it was strained by harvest failure, high expenditure on armaments, and inflation. The final tightening of the screw came with America's declaration of war in April 1917, after which the only major gap in the blockade was the import of iron ore from Sweden.

The impact of the blockade could only be expected to be severe from the winter of 1916–17. Earlier, even when German war production was affected by lack of raw materials, German science could find solutions. For example, the blockade denied Germany imports from Chile of nitrates, but the nitrogen required for explosives manufacture could be obtained from the atmosphere using the Haber/Bosch process. Likewise wood or other cellulose material could be used as a substitute for cotton in the manufacture of smokeless powder. These processes tended to be slower than those with the original raw material but, as in Britain, munitions production was given priority over civilian consumption. The impact of the blockade was greatest in its effects on the diet of the German population. The absence of imported fertilisers and the loss of manpower and horses to the army led to a 30 per cent fall in harvests of all grains in 1917.⁷¹ There were serious food shortages in the so-called 'turnip winter' of 1916–17, and during 1917 and 1918 official rations were inadequate to meet minimal nutritional requirements and people had to resort to black markets. The German people did not starve, but they were hungry, and morale suffered. The spirit of national resistance was reduced by the blockade: food shortages led to strikes and

⁷¹ Roger Chickering, *Imperial Germany and the Great War, 1914–1918* (Cambridge University Press, 1998), p. 142.

discontent with the regime, and helped to undermine military and naval discipline in 1918. However, the blockade alone would not have been sufficient to defeat Germany. Germany was vulnerable to blockade because of the strain of war on her economy. Had nitrogen been available for fertilisers instead of for explosives, or had horses been available for ploughing instead of for military transport, the population could have been fed satisfactorily, even though a quarter of pre-war German food consumption had been imported.⁷²

Britain was more dependent than Germany on imports of food and raw materials, and therefore was more vulnerable to blockade. A successful anti-submarine strategy was crucial to the maintenance of the British war effort. Between the beginning of August 1914 and the end of September 1915 the amount of merchant shipping available to Britain actually increased, from 16,842,000 tons to 17,016,000 tons, partly on account of the addition of enemy ships captured at the outbreak of war. However, in October 1916 the Board of Trade warned that British shipbuilding was no longer keeping up with losses and that the merchant tonnage had fallen between 30 September 1915 and 30 September 1916 to 16,255,000 tons.⁷³ British losses rose from September 1916 when improved coastal U-boats were based in Flanders, and in the following month the Germans launched a new submarine campaign in the Atlantic. At this stage, 80 per cent of ships sunk had first received a warning from the U-boat captain but the Germans decided to resume unrestricted submarine warfare with effect from 1 February 1917. The German High Command was willing to risk American intervention because it believed that Germany, with fewer resources than the Allies, would lose a long war and must therefore resort to what seemed to be the only way to achieve rapid victory. The German naval staff believed that unrestricted submarine warfare could increase Allied losses by 50 per cent – a forecast fulfilled in the first six months of the campaign. Much less accurate was their belief that six months of the higher rate of losses would cut British imports of grain by 40 per cent, creating bread shortages that would force Britain to make peace. As Offer has commented, the calculations that produced these figures were based on fallacies and showed the shortcomings of intuitive reasoning as opposed to rigorous economic analysis; in the event British reserves of grain rose as it was given higher priority than other imports.⁷⁴ The Germans also underestimated the

⁷² Bell, *Blockade*, pp. 671–91; Offer, *First World War*, pp. 23–77.

⁷³ 'Merchant shipping', memorandum by the President of the Board of Trade, 26 Oct. 1916, CAB 42/22/6, TNA.

⁷⁴ Offer, *First World War*, pp. 357–66.

ability of the British government to organise rationing. To compound matters, the Germans failed to divert enough production from army needs to U-boat construction.⁷⁵ Nevertheless, the British rate of loss of merchant ships far exceeded replacement building in 1917 and could not have been sustained beyond the end of that year without drastic measures being taken to economise on shipping, such as the curtailment of supplies to Italy and the withdrawal of some of the British forces facing the Bulgarians at Salonika.⁷⁶

The most important single solution to the U-boat menace proved to be the convoy system. However, down to the spring of 1917 the Royal Navy preferred to conduct offensive anti-submarine patrols and to lay mines, although it was not until late 1917 that British mines were effective against submarines. The great weakness of the submarine was its dependence on batteries for submerged running; prolonged pursuit by hydrophone contact could eventually bring it to the surface with its batteries exhausted. The problem was how to establish the initial hydrophone contact, and the navy was slow to grasp that its ships were more likely to do so if they were close to the U-boats' targets, as convoy escorts, rather than patrolling trade routes. The Admiralty's War Staff had doubts about merchant captains' skill in keeping station in a convoy and the ability of ports to cope with the task of unloading ships that arrived in large groups, and believed that the navy lacked sufficient escort vessels for the number of ships daily entering British ports. Nevertheless, convoys to the Netherlands from July 1916, and to France from February 1917, had much lower losses than unescorted vessels. According to Lloyd George, Commander Reginald Henderson of the anti-submarine department, who organised the convoys to France, made the 'startling discovery' that Admiralty estimates of the number of escorts required for the trade of the country as a whole were based on statistics that were wrong by a factor of fifteen, and made sure that the Prime Minister was apprised of the facts before he visited the Admiralty on 30 April 1917 to attend a meeting to discuss anti-submarine warfare. In fact, recent research by Nicholas Black has shown that the Admiralty's War Staff was aware of the true numbers of ships crossing the Atlantic by late December 1916, if not earlier, and the decision to experiment with transatlantic convoys in May 1917 was the result of staff officers gradually changing their minds over the previous five months rather than a response to Lloyd George's visit. There really was

⁷⁵ Holger Herwig, 'Total rhetoric, limited war: Germany's U-boat campaign, 1917–1918', in Chickering and Förster (eds.), *Great War, Total War*, pp. 189–206.

⁷⁶ Lloyd George, *War Memoirs*, vol. III, pp. 1127–9.

a shortage of escort vessels and a crucial element in the success of the regular system of convoys from mid-June was the deployment of additional destroyers of the US Navy.⁷⁷ As the system was expanded to other routes, losses fell below replacement levels. Even so, the shipping shortage had to be relieved by concentrating as much trade as possible on the shorter North Atlantic routes, as opposed to the longer voyages to South America or the Pacific, thereby increasing Allied reliance on American financial aid.

Command of the sea allowed Britain and her allies access to the resources of the wider world, while denying them to the enemy. Troopships could convey reinforcements from Empire countries. Amphibious operations could be undertaken, and armies maintained at a distance from the United Kingdom. Germany's colonies, in contrast, were cut off from reinforcement. Of these advantages, the first was the most important: imported raw materials and American munitions increased Britain's war effort, while blockade diminished Germany's. The second advantage was also important: Australia, Canada, Newfoundland, New Zealand and South Africa between them contributed 317,000 troops to expeditionary forces in November 1917, or 14 per cent of the British contribution at that date; India contributed 187,000, a figure that rose to 259,000 in November 1918, or 12.5 per cent of a reduced British contribution of 2,075,000.⁷⁸ On the other hand, the possibilities of a maritime strategy had been diminished, compared with earlier wars, by the development of inland transport and it is no coincidence that the Dardanelles expedition, and the Salonika, Mesopotamia and Palestine campaigns, were conducted far from the dense Central European railway network.

Military strategy

British military strategy in the First World War is an enduring subject of debate. Should Britain have used command of the sea to land forces at strategic points? Should commitment to the Western Front have been limited and more effort been put into defeating Germany's allies? On the Western Front itself, did tanks offer an alternative to the strategy of attrition represented by the Somme and Passchendaele? These were

⁷⁷ N. D. Black, 'The Admiralty War Staff and its influence on the conduct of the naval war between 1914 and 1918', Ph.D. (University of London, 2005), pp. 171–8. Lloyd George's version is in his *War Memoirs*, vol. III, pp. 1143–7, 1151–69. Halpern, *Naval History*, pp. 351–66, is a balanced account, apart from repeating the story about misleading statistics.

⁷⁸ War Office, *Statistics of the Military Effort of the British Empire*, pp. 31–7.

questions that Liddell Hart tended to answer in the affirmative in the 1930s, when he had some influence on ministerial thinking about a future continental commitment (see p. 154).⁷⁹

Alternative strategies have to be related to the overriding objective of defeating Germany. Capture of German colonies might provide diplomatic counters and deny German raiders coaling stations, but Germany had invested little in these territories and their loss was not going to deflect her from her aims in Europe. The BEF was not required for colonial warfare. British participation in the capture of Germany's only strongly fortified overseas base, Tsingtao, was limited to a token contingent in what was essentially a Japanese operation. Germany's African colonies were conquered by native African, Indian and white South African troops in campaigns which did not impinge perceptibly on the United Kingdom's war effort.⁸⁰

Stalemate on the Western Front led Lloyd George in January 1915 to suggest alternatives to reinforcing the BEF there. He proposed that 600,000 men be sent to Salonika or the Dalmatian coast from where, he believed, they could combine with the Serbs and the still neutral Greeks and Romanians to attack Austria-Hungary, thereby helping Russia and encouraging Italy to enter the war on the Allied side. He also proposed that a further 100,000 men be landed on the Syrian coast to cut off the Turkish army that was about to invade Egypt.⁸¹ Neither suggestion took account of the logistical difficulty of transporting and maintaining so many troops in distant theatres, nor in the case of the Balkans of persuading neutral states to co-operate. In the event, the Turkish attack on the Suez Canal was repelled in February 1915 by Anglo-Indian forces already in Egypt.

There were other schemes under consideration in early 1915 but the War Council increasingly came to see the Dardanelles as the best option. Churchill had said in November 1914 that an attack on the Dardanelles would require a large military force. However, following a Russian appeal on 1 January 1915 for more help, he became the most enthusiastic advocate of a naval expedition to bombard the Turkish forts defending the straits and, having cleared the minefields there, to proceed to Constantinople and perhaps topple the pro-German regime there.⁸²

⁷⁹ For Liddell Hart's views, see his *The British Way in Warfare* (London: Faber and Faber, 1932), pp. 38–41, and *A History of the World War, 1914–1918* (London: Faber and Faber, 1934), pp. 332–43, 435–48, 545–51, 586–9, 591–2.

⁸⁰ Strachan, *First World War*, vol. I, chs. 6–7.

⁸¹ Lloyd George, 'The war: suggestions as to the military situation', 1 Jan. 1915, CAB 42/1/8, TNA, reproduced in Lloyd George, *War Memoirs*, vol. I, pp. 369–80.

⁸² See, for example, Hankey's notes for the meeting of 13 Jan. 1915, CAB 22/1, TNA, reproduced in Martin Gilbert, *Winston S. Churchill*, vol. III, companion, part I

On 2 February Hankey summed up for Asquith the arguments in favour of a *military* expedition to keep the straits open for merchant ships. Russia had manpower but lacked munitions, and the Archangel and Vladivostok supply routes were inadequate. Hankey and ministers seem to have overlooked the point that the opportunity cost of the decision to expand the British army was a lack of munitions available for allies. However, ministers also believed that the expedition would have political benefits in its effects on the attitudes of Balkan states, and Hankey stressed the economic benefits of releasing merchant shipping cooped up in the Black Sea and allowing Russia to export grain, thereby reversing the wartime rise in world prices.⁸³ Unfortunately the operations to open the Dardanelles were almost an object lesson in poor planning, characterised by a lack both of staff work and of inter-departmental co-ordination. The naval bombardment of the Turkish forts began on 19 February but it was not until 25 April that the first troops landed, by which time the Turks were well prepared. The fighting on the Gallipoli peninsula was characterised by the same inability of infantry to make progress against machine guns and rifles protected by barbed wire and trenches as on the Western Front. All hopes of breaking through to Constantinople had vanished long before the expedition withdrew in January 1916. Historians still debate the extent of Churchill's responsibility for the failure at Gallipoli, but the lack of proper staff planning suggests systemic failure.⁸⁴

The Mesopotamian campaign against the Turks developed from a small-scale operation into one that absorbed considerable resources. An Indian Army division was dispatched to the head of the Persian Gulf in October 1914 to protect the oilfields at Abadan (of particular interest to the Admiralty following the decision to build oil-burning warships) and to prevent the expansion of Turkish influence towards India. The

(London: Heinemann, 1972), pp. 409–10. Gilbert believes that Churchill's advocacy of an attack by ships alone contributed to the War Council's self-deception that troops could be dispensed with (*Winston S. Churchill*, vol. III, pp. 249, 311). The Russians did not propose an attack on the Dardanelles. Indeed, they were anxious lest any Balkan bloc created by an Allied victory might prejudice their claims to Constantinople; see Keith Neilson, *Strategy and Supply: The Anglo-Russian Alliance, 1914–17* (London: Allen and Unwin, 1984), pp. 57–78.

⁸³ 'The war: attack on the Dardanelles. Note by the Secretary', 2 Feb. 1915, CAB 42/1/30, TNA.

⁸⁴ For a historiography survey, see Edward Spiers, 'Gallipoli', in Brian Bond (ed.), *The First World War and British Military History* (Oxford: Clarendon Press, 1991), pp. 165–88. For Churchill's part, see Michael Howard, 'Churchill and the First World War', in Robert Blake and W. Roger Louis (eds.), *Churchill* (Oxford University Press, 1993), pp. 129–45, at pp. 137–8. For lack of staff work and Hankey's role, see Gooch, *Plans of War*, pp. 309–15. The best account of the campaign is Tim Travers, *Gallipoli 1915* (Stroud: Tempus, 2001).

campaign remained under the direction of the India Office until 1916. One division was sufficient to capture Basra, but Baghdad proved to be too ambitious an objective for so small a force, and in December 1915 General Sir Charles Townshend and his men were surrounded at Kut-el-Amara, where they surrendered on 29 April 1916. The Mesopotamian campaign became a matter of restoring British prestige, Baghdad finally falling on 11 March 1917. Considerations of prestige, Lloyd George's wish to raise the spirits of the British public, and a desire to stake out territorial claims in the Middle East led to another British imperial force taking Jerusalem on 9 December 1917. It is doubtful if these victories did anything to weaken German power. The Palestine campaign did end in the rout of a Turkish army in the Battle of Megiddo in September 1918, when British cavalry for the last time played a significant role by blocking the enemy's retreat, and when 75,000 prisoners were taken for the loss of 5,666 British casualties.⁸⁵ However, the Turkish armistice on 30 October came a month after Germany had decided to seek peace.

The Salonika expedition was originally designed to reinforce the Serbs, who in the autumn of 1915 were facing defeat from Austro-German and Bulgarian forces. The Allies were invited to send troops to Salonika by the Greek Prime Minister, Eleutherios Venizelos, but on the day they landed, 5 October, he was dismissed and Greece remained neutral, accepting the presence of the Allied army under protest. It was not until June 1917 that the Greek king was forced by the Allies to abdicate and Venizelos was restored to office to bring his country into the war. Meanwhile Serbia had been overrun in late 1915 and its defeated army evacuated via Albania to Salonika, where it was re-equipped to fight alongside British, French, Italian and Russian troops. The CIGS, Robertson, thought that the war could not be won in the Balkans, since victory would come only with defeat of the German army, and most of the troops facing the Allies at Salonika were Bulgarian. In his view, Britain did not have enough men and artillery to fight in two main theatres, and even if she had they would be better employed in one.⁸⁶ With the German submarine campaign severely limiting the amount of shipping, Lloyd George told an Anglo-French conference in May 1917 that the essential needs of the civil population of the Allies could only be met by reducing the force at Salonika to that

⁸⁵ Cyril Falls, *The First World War* (London: Longman Green, 1960), pp. 376–80.

⁸⁶ Robertson to Lt.-General G. F. Milne, 7 Nov. 1916, in *The Military Correspondence of Field Marshal Sir William Robertson, Chief of the Imperial General Staff, December 1915–February 1918*, ed. David Woodward (London: Bodley Head for Army Records Society, 1989), p. 102.

required to hold an entrenched camp around the harbour. One British infantry division and two cavalry brigades were transferred to Egypt before the entry of Greece into the war led to a change in policy. There was now to be no withdrawal to an entrenched camp, but Greek divisions were gradually to replace British ones. The mountainous country around Salonika, with its poor roads and limited railways, was not an obvious area from which to bring pressure to bear on Germany, or even Austria-Hungary.⁸⁷ The presence of the Allied army at Salonika was not enough to save Romania from defeat in 1916–17. By 1918, however, the Germans had scaled down their assistance to the Bulgarians, and an Allied offensive beginning on 15 September forced the latter to ask for an armistice on 28 September. The prospect of an Allied advance that would cut Germany's overland communications with Turkey and threaten Germany's sources of oil in Romania added to the pressures that led Ludendorff to decide that Germany must seek an armistice, but the war had already been decided on the Western Front where, as Ludendorff admitted on 29 September, the beaten German army could no longer be relied on.⁸⁸ Had the Germans not been so hard pressed in the west, they could have given more support to their allies in the Balkans.

In June 1917 Lloyd George saw Italy as potentially more profitable than Flanders for the employment of British artillery. He hoped to enable the Italian army to capture Trieste and knock Austria-Hungary out of the war. However, Robertson and Haig successfully resisted sending guns on a scale that would hamper their plans for an offensive on the Western Front. They argued that superior railway links would enable the Germans to transfer troops more rapidly to Italy than the Allies could do, and that the Germans would do what was necessary to keep Austria-Hungary in the war. They believed that Lloyd George's hopes that Austria-Hungary could make a separate peace were in any case unrealistic, given the extent to which the Austro-Hungarian and German armies were intermingled.⁸⁹ It was only after the Italian defeat by Austro-German forces at Caporetto in October 1917 that British

⁸⁷ 'Report of the Cabinet Committee on War Policy', 10 Aug. 1917, CAB 27/6, TNA.

⁸⁸ David Stevenson, *1914–1918: The History of the First World War* (London: Allen Lane, 2004), p. 468; Wilhelm Deist, 'The military collapse of the German Empire: the reality behind the stab-in-the-back myth', *War in History*, 3 (1996), 186–207.

⁸⁹ Haig's 'Note on the strategical situation with special reference to the comparative advantages of an offensive in Northern Belgium as against an offensive from Italy against Austria', read at meeting of Cabinet Committee on War Policy, 20 June; Secretary's notes of meeting of that Committee on 21 June, and Report of the Committee, 10 August (all 1917), CAB 27/6; 'Note by the CIGS [Robertson] on the Prime Minister's memorandum regarding future military policy', 23 June 1917, CAB 27/7, TNA. For context, see David French, *The Strategy of the Lloyd George Coalition, 1916–1918* (Oxford: Clarendon Press, 1995), pp. 135–9.

divisions were transferred to Italy. The 75,000 British troops there by 1918 played a significant part in the Italians' victory at Vittorio Veneto between 26 October and 4 November. However, by then Allied pressure on the Western Front was preventing the Germans from sending reinforcements to Italy, as they had done in 1917; the Austro-Hungarian state was close to dissolution on ethnic lines; and its army was short of rations owing to blockade and war-induced exhaustion of the economy.

Notwithstanding the victories over Germany's allies, it is doubtful whether the various strategies favoured by 'Easterners' could have avoided the necessity for defeating the German army in France and Belgium. Indeed, it could be argued that campaigns against Turks and Bulgarians weakened the Allied war effort by diverting British troops away from fighting Germans. For example, in April 1916, out of fifty-two British divisions abroad, five were in Egypt, one in Mesopotamia, five at Salonika, and forty-one in France. In July 1917 a total of 550,000 British troops were deployed in Egypt and Mesopotamia, against an estimated 120,000 Turks, while 600,000 Allied troops, of whom 200,000 were British, faced 300,000 Bulgarians at Salonika.⁹⁰

On the other hand, there is plenty of room for debate as to the wisdom of strategies adopted on the Western Front. The first question that had to be decided in August 1914 was whether the BEF should join the left flank of the French army, as the French expected, on the basis of pre-war staff talks, or whether it should have an independent role in Belgium, as the commander of the BEF, Sir John French, initially favoured. The insistence of the French, and the absence of pre-war staff talks with the Belgians, decided the matter. Although Sir John was instructed by Kitchener to consider himself to be the commander of an independent force, there was little choice but to conform to the movements of the much larger French army. When the Germans threatened Antwerp in October a brigade of marines and two brigades of seamen untrained in land warfare were sent by Churchill to reinforce the Belgian army, but were unable to prevent the fall of the city. Almost the whole Belgian coast fell to the Germans, thereby arousing traditional British fears of invasion, and also enabling the Germans to establish submarine bases close to the Channel.⁹¹ In January 1915 Sir John French wanted to advance along the Flanders coast to Zeebrugge, but he admitted that the French Commander-in-Chief, Marshal Joffre, was not much moved by the danger to

⁹⁰ Minutes of Cabinet Committee on the Size of the Army, 18 Apr. 1916, CAB 27/3; Sir William Robertson: 'Palestine', 19 July 1917, CAB 27/7, TNA.

⁹¹ William James Philpott, *Anglo-French Relations and Strategy on the Western Front, 1914-18* (Basingstoke: Macmillan, 1996), pp. 8-49.

the British army's communications from U-boats.⁹² Britain would remain very much the junior partner in matters of military strategy until the army being recruited by Kitchener was ready to take the field.

As Kitchener was not in the habit of putting his ideas down on paper or of discussing his plans with the Cabinet or the General Staff, no one can be sure of what he intended to do with his army of volunteers. The most convincing explanation has been put forward by David French, who suggested that Kitchener reckoned that by the time his troops were trained and at the peak of their numerical strength in early 1917, the armies of both their enemies and their allies would have fought themselves to a standstill. The British would then be able to deliver the final blow and be in a position to ensure that peace was made on British terms.⁹³ On 19 August 1915 Kitchener told Haig that he had favoured a policy of active defence in France until the British army was ready to strike with all of its forces, but the defeat of the Russian army in Poland, where Warsaw fell on 5 August, had changed his mind.⁹⁴ Russia naturally looked to its allies for offensives to divert German forces. France expected the British to help to expel the Germans from her territory as quickly as possible. Hence the first British offensives in 1915, at Neuve Chapelle (March) and at Loos (September), were timed to coincide with French offensives in Champagne as part of a strategy, devised by Joffre, to assault each flank of the great German salient in the centre of the Western Front. As Kitchener commented, 'one makes war not as one would like to, but as one must'.⁹⁵ The same comment applies to Churchill's argument that the Allies should have refrained from large-scale offensives on the Western Front during the years 1916–18. Churchill believed that the offensive strategy adopted cost the Allies more casualties than those they inflicted on the Germans. As an alternative, he suggested a strategy of 'dynamic defence', with limited local offensives to pin down the German forces in the west, while the blockade slowly weakened the German war effort.⁹⁶ It is doubtful if such a strategy would have been as acceptable to the French, Russians and Italians as the one adopted in 1916 and 1917 of simultaneous Allied offensives on all fronts. Moreover, as already noted, the blockade was most effective when combined with military operations that forced the Germans to divert substantial resources from agriculture.

⁹² War Council minutes, 13 Jan. 1915, CAB 42/1/16, TNA.

⁹³ David French, 'The meaning of attrition, 1914–1916', *English Historical Review*, 103 (1988), 385–405.

⁹⁴ *Douglas Haig: War Diaries and Letters 1914–1918*, ed. Gary Sheffield and John Bourne (London: Weidenfeld and Nicolson, 2005), p. 137.

⁹⁵ Howard, *Continental Commitment* p. 126.

⁹⁶ Gilbert, *Winston S. Churchill*, vol. III, companion, part 2, p. 1069; Churchill, *World Crisis 1916–1918*, part II, part II, pp. 618–39.

Haig claimed in his final dispatch in March 1919 that the strategy of attrition to wear down the German army in 1916 and 1917 was a precondition of victory in 1918. He argued that the course of the war could not be understood unless the long succession of battles, beginning with the Somme in July 1916 and ending on the Sambre in November 1918, were seen as forming one continuous engagement, in which heavy losses on both sides were inevitable, but which resulted in the weakened Germans giving way once they had exhausted their reserves.⁹⁷ However, if one widens the perspective to include all fronts, one could say that the offensive strategy pursued by the Allies had so weakened the French, Russians and Italians by 1917 that there was mutiny in the French army in May and June after General Nivelle's unsuccessful offensive on the Aisne; the Russian army collapsed after the so-called Kerensky offensive in July, hastening the rise of Bolshevism; and the Italian army was exhausted after repeated battles on the Isonzo before its defeat at Caporetto. Haig himself attributed the final exhaustion of the Germans' reserves to the series of offensives undertaken by Ludendorff between March and July 1918. It is not clear, therefore, that the offensive was always superior to the defensive. From Loos to the end of 1917 Haig was excessively optimistic at the outset of each battle about breaking through the enemy line, and he incurred heavy casualties on the Somme and at Passchendaele by prolonging his offensive in adverse weather long after the attack had lost its impetus.⁹⁸ His strategic objective in 1917 of clearing the Germans from their submarine bases in Flanders was as far from being achieved at the end of the year as it had been at the beginning.

Controversy over British strategy on the Western Front in 1918 is perhaps greatest over the last period of the war, when the Allies were advancing. Tim Travers has pointed out that British casualties were higher than they had been in 1917: 314,000 for the period 7 August to 11 November 1918, compared with 271,000 in the Passchendaele offensive from 31 July to mid-November 1917. He believes that mechanical warfare was a genuine alternative to heavy reliance on infantry, and that by concentrating tanks in large numbers instead of employing them in 'penny packets' lives would have been saved.

⁹⁷ *Haig's Despatches*, pp. 319–20.

⁹⁸ For Haig's excessive optimism, see Robin Prior and Trevor Wilson, *Command on the Western Front: The Military Career of Sir Henry Rawlinson 1914–1918* (Oxford: Blackwell, 1992), pp. 106–7, 113–16, 124, 146–53. For trenchant criticism of Haig persisting with battles beyond the capacity of his army, see Winter, *Haig's Command*, pp. 45–69, 88–98, 103–13.

However, as he himself notes, tank crews could not last more than eight hours in action, on average, and mechanical unreliability meant that tanks could not be used for more than two days in a row. David Childs has argued that there were not enough tanks available in 1918, and that they could not be brought to the front quickly enough or supplied in mobile warfare to make possible their use in mass attacks. Even Travers concedes that Haig's anxiety to keep the German army on the run by a series of short offensives was understandable, since Haig was rightly convinced that the German army was demoralised.⁹⁹ Churchill was an enthusiastic advocate of tanks and, as minister of munitions, was responsible for their production, but when he wrote in June 1918 of employing over 7,000 tanks (compared with the Tank Corps' existing establishment of 1,080 tanks) he was looking forward twelve months.¹⁰⁰ The CIGS, Wilson, proposed to Haig in July 1918 that the British army's cavalry should be reduced by a third, and its mechanised force expanded to 3,000 tanks plus 7,300 tractors and cross-country vehicles, but again this was a plan for 1919.¹⁰¹ On Travers' own evidence, the number of tanks available to the British army in August 1918 varied widely from day to day, according to battle casualties, wear and tear, and maintenance: 688 on the 11th, 200 on the 12th, 738 on the 17th.¹⁰² The numbers available fell in the autumn, more often than not to figures well below 100.¹⁰³ It is by no means certain that it would have been wise to restrict British attacks according to the supply of tanks, or whether such a strategy would have been acceptable to the French or the Americans.

Victory in 1918 came more quickly than expected. On 25 July, one week after the last German offensive had been halted, Wilson produced a major paper on military policy in which he advocated a series of operations with limited objectives designed to push the Germans back from various strategic points, such as the Amiens railway junction. However, he thought that preparations for a decisive effort by the Allies should be planned for 'not later than 1st July 1919'.¹⁰⁴ By 3 September

⁹⁹ Travers, *How the War Was Won*, pp. 127–30, 137–40, 175–6, 179, 181; T.H.E. Travers, 'Could the tanks of 1918 have been war winners for the British Expeditionary Force?' *Journal of Contemporary History*, 27 (1992), 389–406, at 392 and 398; Childs, *Peripheral Weapon?* pp. 171–89.

¹⁰⁰ Churchill to General Harington (Deputy CIGS), 21 June 1918, printed in Churchill, *World Crisis: 1916–1918*, part II, pp. 321 and 482–3.

¹⁰¹ Sir Henry Wilson, 'British military policy 1918–1919', 25 July 1918, CAB 27/8, TNA.

¹⁰² Travers, *How the War Was Won*, p. 127.

¹⁰³ Griffiths, *Battle Tactics*, p. 167.

¹⁰⁴ Wilson, 'British military policy 1918–1919'.

1918 Haig was sufficiently encouraged by the capture of 77,000 prisoners and 800 guns in four weeks, and evidence of indiscipline in the German army, to believe that 'the beginning of the end' had been reached.¹⁰⁵ On 18 October he told ministers that the German army had been badly beaten but that it was capable of retiring to its own frontier and holding that line against equal or even superior forces. The French army, he thought, was greatly worn out and the American army was ill trained and would not be a serious fighting force for at least a year. The British army, with its infantry already 50,000 under strength, was not, in his opinion, sufficiently fresh and strong to force a decision by itself.¹⁰⁶ Nevertheless, there is evidence that the forces of the British Empire – with the Australians and Canadians prominent – made a disproportionate contribution to the defeat of the German army. Between 18 July and 11 November the British captured 188,700 prisoners and 2,840 guns, compared with 139,000 prisoners and 1,880 guns taken by the French, and 43,000 prisoners and 1,421 guns taken by the Americans.¹⁰⁷

The Germans were defeated partly because they could not afford to lose so many men as the Allies, especially once the latter could look forward to American reinforcements, but also because of the overwhelming superiority of the Allies in material. The Western Front was where Britain could employ the bulk of her army and the products of her industrial power most effectively, given the short lines of communication compared with the various alternative (or additional) strategies advocated by Easterners. Concentration of military resources on the Western Front was also what best suited naval policy, given shortages of anti-submarine escorts and of shipping.¹⁰⁸ While Haig appears to have thought primarily in terms of killing Germans rather than in terms of exhausting Germany's material resources (in conjunction with blockade), he did argue in June 1917 that failure to maintain pressure through offensive action would give the Germans time in which to replenish food, ammunition and other requirements.¹⁰⁹ The blockade created hunger and discontent, and the Allies' offensive strategy on the Western Front compelled the Germans to use up resources more rapidly than a defensive strategy would have done.

¹⁰⁵ Douglas Haig: *War Diaries and Letters*, p. 458.

¹⁰⁶ 'Note of a conference at 10 Downing Street', 18 Oct. 1918, CAB 23/16, TNA.

¹⁰⁷ John Terraine, *To Win a War. 1918: The Year of Victory* (London: Sidgwick and Jackson, 1978), p. 258.

¹⁰⁸ Sir John Jellicoe, 'Future naval policy', 9 Oct. 1917, CAB 27/8, TNA.

¹⁰⁹ Sir Douglas Haig, 'Present situation and future plans', 12 June 1917, CAB 27/7, TNA.

Summary

Britain contributed technical innovation, industrial and financial power, and military manpower to the Allied victory. Hydrophones, tanks and aircraft are obvious examples of new weapons, and hardly suggest industrial backwardness or military conservatism. However, innovation with traditional weapons was no less important. New scientific artillery techniques made a bigger contribution to the defeat of the German army in 1918 than the more publicised tank. Even new weapons depended upon tactical innovation to be effective. The army's success was possible only when the different arms – artillery, infantry, tanks (when available) and aircraft – had learned to operate together. The navy's success over the U-boat required the adoption of the convoy system as well as the development of hydrophones.

Victory also depended on the economy's ability to equip the largest army Britain has ever put in the field, while maintaining the largest navy in the world and producing more aircraft than Germany. The vast industrial effort required was beyond Britain's own resources, which had to be supplemented by imports from North America. The willingness of private American investors to lend to the British government reflected Britain's credit in financial markets, and her allies benefited from her ability to raise loans. The Royal Navy's command of the sea, and eventual success against the submarine, was also necessary to allow Britain to draw upon the resources of the rest of the world.

Germany was vulnerable to blockade because of her need to divert resources (chemicals, horses and manpower) to sustain her armies. Sea power also allowed Britain to attempt a major maritime operation (the Dardanelles) and to supply armies in the Balkans and the Middle East. Nevertheless, most of the army was committed to the Western Front. Controversy over Haig's strategy of attrition is likely to continue *sine die*. Nevertheless, it made sense as part of total strategy. The choice made in 1915 to go beyond a limited continental commitment ensured that the German army would always be under pressure and consequently that the German economy would be under pressure too. The strategy worked only because the combined efforts of the Allies denied Germany an early victory. A more limited British contribution on land, such as was subsequently advocated by Liddell Hart, might have undermined Allied unity.

The costs to Britain of a long war were the loss of export markets, which were never wholly recovered, and a weakening of her financial power through the sale of overseas assets and the accumulation of debts.

Britain never again enjoyed the advantage of huge balance-of-payments surpluses that had marked the pre-1914 period. Victory had been achieved by a combination of Britain's traditional way of warfare – blockade, loans or subsidies to allies and maritime operations – and an unprecedented continental commitment, but it came at the price of a permanent weakening of British power.

3 Retrenchment and rearmament, 1919–1939

Introduction

British defence policy in the inter-war years may be divided into two phases: 1919 to 1932, when economic problems and the absence of pressing dangers to national security led to reductions in the armed forces; and 1932 to 1939, when the darkening international situation gave defence preparedness increasing political priority. However, many of the strategic problems encountered during the later 1930s were rooted in the earlier phase, and this chapter analyses the period 1919–39 as a whole. There is a danger in this approach, since policies in the 1920s may be judged unfairly in the light of later events, but that is true even of the 1930s, when British defence policy was designed to deter aggression over an indefinite period even if the Chiefs of Staff were planning from 1934 on the basis of being ready for war by 1939.

In August 1919 the Cabinet decided that the defence departments should revise their estimates of expenditure for the coming year on the assumption that ‘the British Empire will not be engaged in any great war during the next ten years, and that no Expeditionary Force is required for this purpose’.¹ The purpose of this ‘Ten Year Rule’, as it came to be called, was to assist the chancellor of the exchequer in securing the cuts in expenditure required to balance his budget and, in one form or another, the rule remained the guiding principle of defence policy until 1932. At the time it did not seem to the Foreign Office to be unreasonable. Under the Treaty of Versailles signed on 28 June 1919 the Rhineland was to be occupied by Allied forces for up to fifteen years and demilitarised permanently; Germany’s army was limited to 104,000 long-service volunteers (thereby restricting its ability to train reserves), and denied tanks or heavy guns; her navy was limited to six pre-dreadnoughts (or replacements of no more than 10,000 tons) and six light cruisers, and was forbidden to have submarines; and she was to

¹ War Cabinet ‘A’ minutes, 15 Aug. 1919, cited in N. H. Gibbs, *Grand Strategy*, vol. I: *Rearmament Policy* (London: HMSO, 1976), p. 3.

have no air force. Britain thus faced no immediate major armed threat in Europe and, although it was known that Germany was not abiding strictly by the disarmament clauses of the peace treaty, Allied troops were withdrawn from the Rhineland in 1930.

Relations between Britain, Japan and the United States were influenced by the weakness of China, which was prone to civil war and had difficulty in resisting Japanese encroachments that threatened British and American markets there. The Americans hoped that Japanese policy would be less assertive if the Anglo-Japanese alliance, which was due for renewal, were allowed to lapse, and it was agreed in December 1921 at the Washington conference to replace the alliance with a rather nebulous four-power treaty, whereby Britain, France, Japan and the United States were to discuss jointly any threat to peace in the Pacific region. In February 1922, at the same conference, the leading naval powers agreed to limit their strengths in capital ships and aircraft carriers in the ratios: British Empire and United States 5; Japan 3, France and Italy 1.67; plus a ten-year moratorium (with certain exceptions) on building new capital ships and (again with certain exceptions) limits to the maximum tonnages of capital ships (35,000 tons), aircraft carriers (27,000 tons) and cruisers (10,000 tons). Japanese acceptance of a ratio of 60 per cent of American and British capital ships was balanced by a non-fortification agreement covering the western Pacific which, in effect, meant that Britain would not possess a major base closer to Japan than Singapore, or the United States one closer than Hawaii.²

Meanwhile, in June 1921, the Standing Defence Sub-Committee of the Cabinet had approved the building at Singapore of a naval base capable of maintaining the main fleet, to show that Britain could fulfil its commitments in the Far East. The Labour government of 1924 cancelled the scheme, but the Conservatives, who returned to office later that year, restarted the work. Churchill supported the decision to build the base, but nevertheless told the Prime Minister, Stanley Baldwin, that he did not believe that there was the slightest chance of war with Japan 'in our lifetime' and that Singapore's defences need not be completed for another fifteen to twenty years. Churchill was chancellor of the exchequer at the time, and trying to limit the naval estimates, but the Foreign Secretary, Austen Chamberlain, also took the view that the prospect of war with Japan was 'very remote'.³ What no one could predict in the 1920s was the extent to which the world depression of the

² Erik Goldstein and John Maurer (eds.), *The Washington Conference, 1921–22: Naval Rivalry, East Asian Stability and the Road to Pearl Harbor* (Ilford: Frank Cass, 1994).

³ Churchill to Baldwin, 15 Dec. 1924, printed in Gilbert, *Winston S. Churchill*, vol. V, companion, part 1, pp. 303–7, at p. 306; CID minutes, 5 Jan. 1925, CAB 2/4, TNA. For

early 1930s would drive Japan to try to deal with overpopulation, unemployment and popular unrest through territorial expansion. The Japanese army used the Mukden Incident in September 1931 to seize Manchuria from China, and in January 1932 there was further fighting in Shanghai, where about three-quarters of British investments in China were concentrated. In these circumstances, the Cabinet accepted in March 1932 the recommendation of the Chiefs of Staff that the Ten Year Rule should be ended, while also recognising the Treasury's advice that this decision must not be taken to justify an increase in defence expenditure without regard to the country's serious financial and economic situation.⁴ Britain had been forced to suspend the gold standard in September 1931 and unemployment peaked in 1932. A further reason for delay was the opening of the World Disarmament Conference at Geneva in February 1932; the government had no plans to disarm but had to take account of public opinion, which could be expected to be hostile to an increase in defence expenditure.⁵

For most of the inter-war period the immediate problems facing the armed forces related to local resistance to British rule or influence. Following disturbances beginning in 1919, Egypt was granted nominal independence in 1922, but Britain retained effective control over foreign relations and defence, her right to station her armed forces to defend the Suez Canal and the naval base at Alexandria being confirmed by the Anglo-Egyptian treaty of 1936. The decision to convert the Royal Navy from coal to oil had greatly increased British interest in the Middle East. The British army was engaged in maintaining security in the newly acquired mandates of Iraq and Palestine and was so hard pressed in Iraq that aircraft were used to control hostile tribesmen by bombing them, a practice euphemistically known as 'air policing'. This policy proved to be so economical in terms of manpower and money that it was extended to the North-West Frontier of India, where insurgency continued to be a periodic problem into the 1930s. Air policing was not used where its effects would be visible to the media and an Arab uprising in Palestine from 1936 to 1939, in protest against Jewish immigration, required the equivalent of two British army divisions to maintain order.⁶

the origins of the base, see James Neidpath, *The Singapore Naval Base and the Defence of Britain's Eastern Empire, 1919-1941* (Oxford: Clarendon Press, 1981), pp. 15, 34-54.

⁴ Cabinet conclusions, 10 Feb. 1932 and 23 Mar. 1932, CAB23/70, TNA.

⁵ See Dick Richardson and Carolyn Kitching, 'Britain and the World Disarmament Conference', in Peter Catterall and C. J. Morris (eds.), *Britain and the Threat to Stability in Europe, 1918-45* (Leicester University Press, 1993), pp. 35-56.

⁶ See Anthony Clayton, *The British Empire as Superpower, 1919-39* (Basingstoke: Macmillan, 1986); Keith Jeffrey, *The British Army and the Crisis of Empire 1918-22*

It is not surprising, notwithstanding the appointment of Hitler as chancellor of Germany on 30 January 1933, that the annual review by the Chiefs of Staff in October that year took a broad view of British commitments. The three most important were listed as: (i) defence of British possessions and interests in the Far East; (ii) European commitments; and (iii) the defence of India against Soviet aggression.⁷ A Defence Requirements Sub-Committee of the CID, known to history as the DRC, and comprising the Cabinet Secretary, Hankey, the official heads of the Foreign Office and the Treasury, Sir Robert Vansittart and Sir Warren Fisher, and the Chiefs of Staff, met between November 1933 and February 1934 to review the deficiencies of the armed forces, an exercise that inevitably led them to review commitments, present and prospective. Although the First Sea Lord, Sir Ernle Chatfield, and Hankey, were mainly concerned with the Far East, Vansittart and Fisher believed that Germany, not Japan, represented the prime danger. The committee's report, drafted by Hankey, represented both points of view. Ministers were advised that Japan would respect strength and that a policy of 'showing a tooth' by completing the Singapore base should be combined with efforts to improve Anglo-Japanese relations. However, Germany must be taken to be the 'ultimate potential enemy' against whom 'long range' defence policy must be directed. Germany was not expected to be ready for war before 1939, and therefore there was 'time, though not too much time, to make defensive preparations'. Despite this warning, it took almost five months of ministerial discussions before the Cabinet agreed in July 1934 on a programme 'for meeting our worst deficiencies'.⁸

Fisher and the Chancellor of the Exchequer, Neville Chamberlain, were strong advocates of better relations with Japan. They believed that if Britain did not combine with the United States to insist on Japan continuing to accept a lower ratio at the forthcoming London naval conference in 1935, the way would be cleared for an Anglo-Japanese non-aggression pact. Greg Kennedy and Keith Neilson have strongly criticised the Treasury's anti-American sentiments and optimistic views regarding Japan.⁹ However, after the Treasury's attempts between 1934

(Manchester University Press, 1984); David E. Omissi, *Air Power and Colonial Control: The Royal Air Force, 1919–1939* (Manchester University Press, 1990).

⁷ 'Annual review of the Chiefs of Staff Sub-Committee', COS 310, 12 Oct. 1933, CAB 53/23, TNA.

⁸ 'Report of the Defence Requirements Sub-Committee', DRC 14, 28 Feb. 1934, CAB 16/109, and 'Defence Requirements: report by Ministerial Committee', CP 205 (34), CAB 24/250, TNA.

⁹ Greg Kennedy, *Anglo-American Strategic Relations and the Far East, 1933–1939* (London: Frank Cass, 2002), pp. 123–5, 136–7, 145–6; Keith Neilson, 'The Defence Requirements Sub-Committee', *English Historical Review*, 118 (2003), 651–84.

and 1936 to use trade and financial discussions to reach an understanding with the Japanese had failed, and Japan had launched a full-scale invasion of China in July 1937, Fisher endorsed the Foreign Office's view that Japan's future actions were incalculable, owing to doubts about the ability of politicians in Tokyo to control their armed forces.¹⁰ Moreover, despite Chamberlain's distrust of American reliability, it was while he was prime minister that Anglo-American naval staff talks began in January 1938. At first there was no more than an exchange of information on strategy and technical matters, and the Americans were non-committal, but the talks were essential first steps in creating an Anglo-American alliance.¹¹

The time in which to make defensive preparations against Germany began to seem much shorter by late 1934 than Hankey had assumed when drafting the DRC report in February. There was increasing concern in London about German rearmament and, in November, Baldwin, responding to Churchill's prediction that Germany would have an air force at least as strong as Britain's in twelve months, pledged the National Government 'in no conditions to accept any position of inferiority with regard to whatever air force may be raised in Germany'.¹² In March 1935 Hitler announced the re-creation of a German air force and the restoration of conscription for the German armed forces. An accelerated expansion scheme for the RAF was approved by the Ministerial Committee on Defence Requirements two months later with a view to keeping pace with Hitler's stated intention of achieving air parity with France. There was some discussion in the committee about whether Japan should still be regarded as the near menace and Germany as the long-range one. The First Lord of the Admiralty, Sir Bolton Eyres-Monsell, and the CIGS, Sir Archibald Montgomery-Massingberd, held to the DRC opinion that Germany would not be ready in a military sense until 1939, whereas they thought that Japan would be a threat in 1936. Chamberlain doubted whether there was any near danger from either Japan or Germany, but supported the policy of expanding the RAF to deter the latter from making a surprise attack by

¹⁰ Note by Edward Bridges (head of the Treasury division dealing with defence and foreign policy issues), 1 Dec. 1937, T 161/779/S.41815, and comment by Fisher on note by Bridges, 12 Jan. 1938, T 161/849/S.42779, TNA. For Treasury attempts to influence policy towards Japan, see Gill Bennett, 'British policy in the Far East 1933-1936: Treasury and Foreign Office', *Modern Asian Studies*, 26 (1992), 545-68.

¹¹ David Reynolds, *The Creation of the Anglo-American Alliance 1937-41: A Study in Competitive Co-operation* (Chapel Hill: University of North Carolina Press, 1981), pp. 16-17, 60-2.

¹² 295 HC Deb., 5s, 1934-5, cc. 866-7, 883.

air.¹³ The Admiralty was glad to accept Hitler's 35 per cent offer as the basis of the Anglo-German Naval Agreement of June 1935, as that ratio would allow 60 per cent of the Royal Navy's capital ships to be deployed in the Far East, if necessary.¹⁴ Sixty per cent would have given Britain parity with the Japanese under the ratio agreed at Washington and extended at the London Naval Conference of 1930, but the Japanese refused in 1935 to agree to anything less than parity with the Americans and British, and did not sign another treaty.

Nineteen-thirty-five also saw the unexpected emergence of a third threat. Italy had been listed in the DRC report in February 1934 as one of the countries against which no additional defence measures were necessary, and in April 1935 the Italian dictator Benito Mussolini had hosted a conference at Stresa where he had appeared to favour a diplomatic 'front' with Britain and France against German aggression. However, his intention, which became increasingly apparent during 1935, to invade Abyssinia, placed the British government in a dilemma: whether to appease Mussolini, with a view to securing his support in Europe, or to support collective security through the League of Nations, as British public opinion expected. The attempt to find a compromise between these positions, by offering Mussolini Abyssinian territory while the League imposed half-hearted sanctions, was unsuccessful, and the possibility that sanctions would lead to war forced Britain to make defensive preparations in the Mediterranean and Egypt. Subsequent attempts to improve relations with Italy failed and Britain thus found herself in a position in which, if she became involved in a war with any one of Germany, Italy or Japan, the other two would probably join in against Britain when it suited them. To make matters worse, there seemed to be little prospect of reconstructing a coalition comparable to the one that had been victorious in 1918. The United States had become increasingly isolationist, with Congress passing the Neutrality Acts of 1935 and 1937, which were designed to keep America out of war by banning the sale of arms and the provision of credits to belligerents. The Soviet Union, distrusted in any case on account of Communism, weakened its armed forces through purges of the officer corps in 1937–8. France was affected later than other countries by the economic depression of the 1930s, and was characterised by domestic political instability.

¹³ Ministerial Committee on Defence Requirements minutes, 27 May 1935, CAB 27/508, TNA.

¹⁴ Joseph A. Maiolo, *The Royal Navy and Nazi Germany, 1933–39: A Study in Appeasement and the Origins of the Second World War* (Basingstoke: Macmillan, 1998), pp. 26–37.

A rearmament programme covering the financial years 1936/7 to 1941/2 was approved by the British Cabinet in February 1936, with Germany now clearly seen as the major threat.¹⁵ The remilitarisation of the Rhineland by Germany in the following month led to a series of Anglo-French staff talks, but prior to 1939 the British were unwilling to enter into firm commitments.¹⁶ Indeed, in the winter of 1937–8, in an effort to keep defence expenditure within limits that the Treasury said the country could afford, the Cabinet decided that the army should not be made ready for European operations at the outbreak of a war until the United Kingdom and its trade routes, and Britain's overseas territories, had been made secure. This decision has been condemned by military historians, notably Howard, Bond and Barnett, who blame it for the British army's deficiencies in 1939–40.¹⁷ Part of the purpose of this chapter is to explain why British grand strategy took the turn it did in 1938, and why Britain none the less made a firm commitment early in 1939 to support France by sending an expeditionary force at the outbreak of war. Why did the Treasury appear to be so influential in defence policy? What technical developments led ministers to reassess the relative importance of air, sea and land warfare? Did Britain keep abreast with other countries in these developments, or was she as militarily backward as Barnett has claimed?¹⁸

Polymakers

Whereas defence policy before 1914 had been very much in the hands of the Admiralty and the War Office, the inter-war period was marked by growing co-ordination through a restored CID and its sub-committees. The fact that there were now three defence departments made it more important to settle priorities as regards strategy and the allocation of scarce resources on a multilateral basis. Political pressures for economy in public expenditure in 1919 led to a strengthening of the Treasury, the new permanent secretary, Fisher, being recognised as head of the Civil Service. Fisher believed that major reductions in expenditure required changes in policy and he encouraged his officials to offer what the Treasury, if not members of the armed forces, regarded as constructive criticism of proposals for additional expenditure. Financial control also

¹⁵ Cabinet conclusions, 25 Feb. 1936, CAB 23/83. For discussions in Cabinet sub-committee, and programme, see CAB 16/123, TNA.

¹⁶ Gibbs, *Grand Strategy*, vol. I, ch. 16.

¹⁷ Barnett, *Collapse of British Power*, pp. 504–5; Bond, *British Military Policy*, pp. 258–60, 338; Howard, *Continental Commitment*, pp. 116–17.

¹⁸ Barnett, *Collapse of British Power*, pp. 475–85.

encouraged officials in the defence departments to engage more in policymaking than hitherto.¹⁹ The Treasury also took advantage of CID membership to find out more about defence expenditure than had been possible by interdepartmental correspondence, and two chancellors, Churchill (1924–9) and Neville Chamberlain (1931–7), played an active role in formulating defence policy.

Lloyd George's principal concern as prime minister after the war was to secure economies that would make it possible to finance social reform within a balanced budget. His successor, Bonar Law, was in office for only eight months before ill health forced him to retire in May 1923. For the next fourteen years the premiership alternated between two men: Baldwin, the leader of the Conservative Party, and James Ramsay MacDonald, the leader of the Labour Party down to August 1931, and thereafter National Labour prime minister in the Conservative-dominated National Government until June 1935. Baldwin, as prime minister in 1923–4, 1924–9 and 1935–7, and as lord president of the council in 1931–5, took a much more active interest in defence than his somewhat relaxed style of leadership suggested, but much of his time in the crucial years 1936 and 1937 was taken up with the abdication of Edward VIII. MacDonald's principal interest in defence was disarmament. His failing health from 1934, and Baldwin's constitutional pre-occupations, gave Chamberlain, as heir apparent to the leadership of the Conservative Party, the opportunity to take the lead in discussions on defence policy, a tendency that became even more marked once he became prime minister in May 1937.

Churchill was still exceptional among ministers in regarding himself as an expert on strategy. As secretary of state both for war and air from January 1919 to February 1921, and as colonial secretary thereafter until October 1922, he promoted the idea of using aircraft for imperial policing. His efforts as chancellor of the exchequer in the second Baldwin government to curb the Admiralty estimates were backed by references to his own experience as first lord. From the backbenches he was the most prominent critic of the government's air rearmament from 1934, yet he was invited in 1935 to serve on the CID's Air Defence Research Sub-Committee. Former Cabinet colleagues tended to see him as a disruptive influence and he was not recalled to office when the post of minister for co-ordination of defence was created in March 1936. The functions of the new minister, Sir Thomas Inskip, were to reduce the pressure of work on the prime minister by acting as his deputy as

¹⁹ See, for example, C.I. Hamilton, 'British naval policy, policy-makers and financial control, 1860–1945', *War in History*, 12 (2005), 371–95.

chairman of the CID, and thus having an oversight of strategy, while also taking over from the president of the Board of Trade as chairman of the Principal Supply Officers Committee, the main sub-committee co-ordinating the allocation of industrial capacity. Chamberlain thought that the minister should not himself be a strategist but should 'see that strategical problems are fairly and thoroughly worked out by the strategists'.²⁰ Inskip, a lawyer, seems to have had a similar conception of his role; he lacked a department of his own and relied a lot on the Cabinet Secretary, Hankey, for advice.²¹ Inskip was replaced in January 1939 by Lord Chatfield, who had recently retired as first sea lord, but who knew nothing of politics and found that his new post lacked any authority independent of the prime minister.²²

In theory, and to some extent in practice, strategy was co-ordinated by the CID and its sub-committees, advised by the Chiefs of Staff, who had their own sub-committees: the Deputy Chiefs of Staff Committee, the Joint Planning Sub-Committee and the Joint Intelligence Sub-Committee. However, there was a tendency for the Chiefs of Staff to add up the requirements of the three defence departments rather than to propose changes that would alter their shares of the chancellor's budget. The CID, with a permanent membership of about twelve ministers, plus the Chiefs of Staff, the permanent secretary of the Treasury and the permanent under-secretary of the Foreign Office, was on the large side to be an effective body, and detailed work was done in sub-committees. Hankey, who was in charge of the Cabinet secretariat until his retirement at the end of July 1938, was praised for his wisdom and monumental memory.²³ He certainly needed the latter: by the end of 1937 the CID had over fifty sub-committees dealing with operational, administrative and industrial questions on an interdepartmental basis. The CID system was a great improvement on the often uncoordinated plans of the Admiralty and the War Office before 1914. However, as one Treasury official observed: 'No doubt there are many things for which committees are essential; nevertheless, they are not the means to speed and decision in action and are apt to relax the individual's sense of responsibility.'²⁴

Plans approved by the CID would proceed only as funds became available, and departments had to take decisions on priorities when

²⁰ Keith Feiling, *The Life of Neville Chamberlain* (London: Macmillan, 1946), pp. 314–15.

²¹ See Sean Greenwood, 'Sir Thomas Inskip as minister for co-ordination of defence, 1936–39', in Paul Smith (ed.), *Government and the Armed Forces in Britain 1850–1990* (London: Hambledon Press, 1996), pp. 155–89.

²² Lord Chatfield, *It Might Happen Again* (London: Heinemann, 1947), pp. 160, 179–82.

²³ Roskill, *Hankey*, vol. III, p. 364.

²⁴ Sir Richard Hopkins (second secretary of the Treasury) to Edmund Compton (Treasury), 15 Dec. 1937, T 161/932/S.42750, TNA.

preparing their annual estimates for submission to the Treasury. Chatfield, who had served in the Admiralty for a total of ten years in the 1920s and 1930s, noted in his memoirs that the services were emasculated not so much by the Treasury as by successive governments acting through the Treasury and its powerful organisation, and that in the 1920s (and, one might add, the early 1930s) the Treasury's quest for economy was backed by public opinion.²⁵ In the later 1930s financial restraint was relaxed, but, as we shall see, the Treasury was still successful in 1937 and 1938 in having strategy related to economic stability.

Strategy had also to be related to the intentions and capabilities of potential enemies. The Industrial Intelligence Centre (IIC) did pioneering work in assessing German output, current and potential but, in the opinion of its head, Desmond Morton, the CID and government departments failed to take on board the full implications of his reports. More generally, the intelligence services failed to provide a balanced analysis of German strengths and weaknesses, being slow to appreciate the pace of German rearmament; then over-estimating the striking power of the *Luftwaffe* in 1937–8; and finally being over-confident in 1938–9 (after the Munich crisis) about what the effects of blockade on the German economy would be.²⁶

The fact that prior to 1936 there was no single minister responsible for all aspects of defence (apart from the prime minister and, from a financial point of view, the chancellor of the exchequer) meant that strategy tended to be worked out on departmental lines. Thus, the RAF's primary concern was an air war with Germany; the navy was much more concerned than the other services with the Japanese menace; and the army tended to give priority to its expeditionary force rather than to air defence. Relations between the service chiefs were not improved by competition for scarce resources. To some extent the mark of an outstanding chief of staff was his ability to defend his department's interests. In particular, Beatty, the first sea lord from 1919 to 1927, could draw on his war-time prestige as a naval commander when resisting Treasury pressure for economy. Trenchard's vision of strategic bombing was crucial in the successful outcome of his Whitehall battle for the independence of the RAF while he was CAS from 1918 to 1930.

²⁵ Chatfield, *It Might Happen Again*, pp. 13, 164–5, 198.

²⁶ Gill Bennett, *Churchill's Man of Mystery: Desmond Morton and the World of Intelligence* (London: Routledge, 2006); Wesley Wark, *The Ultimate Enemy: British Intelligence and Nazi Germany* (London: I. B. Tauris, 1985).

Air weapons

Few statements in Parliament have had more impact than that by Baldwin on 10 November 1932 that 'the bomber will always get through'. He added: 'the only defence is in offence, which means that you will have to kill more women and children more quickly than the enemy.'²⁷ At that date Baldwin did not expect another great war in his lifetime but, with the rise of the German air force under Hitler, fear of air attack cast a shadow over British politics and strategic planning.²⁸ Total civilian deaths due to air attacks on Britain between 1915 and 1918 had been 1,414, and the Germans had abandoned strategic bombing after May 1918. Yet in May 1932 a CID sub-committee, chaired by Baldwin, concluded that the high speed and power of modern aircraft would enable a potential enemy to bomb London on a scale that would result in 6,375 deaths and 12,375 wounded in one week, even after the existing scheme for defence by aircraft, anti-aircraft guns and air raid precautions had been completed.²⁹ What had happened to make the bomber seem so much more formidable a weapon?

At first sight, British bombers in 1932 looked very much like their predecessors in 1918. All were biplanes. Some were twin-engined 'night' bombers but most were single-engined 'day' bombers. Night bombers were slow and the same darkness that gave them some protection against interception also made it difficult to navigate or bomb accurately. Day bombers relied on speed to evade fighters, but had ineffectual bomb loads. The standard British night bomber in 1932, the Vickers Virginia, had been in service for eight years and offered no improvement over the war-time Handley Page 0/400 as regards speed or bomb load, although it had greater range. Progress was more apparent with day bombers: the Hawker Hart of 1930 was faster than any fighter then in service, but its maximum bomb load was only 520 pounds (compared with the Virginia's 3,000 pounds), and its range was only 470 miles (compared with the Virginia's 985 miles). The RAF was not equipped for strategic bombing in 1932. The development of new types of long-range bombers had been held up by the prospect that the Geneva Disarmament Conference, due to begin that year, might agree to abolish big bombing aircraft. Indeed the Air Staff's prime concern was to avoid an international agreement that would prohibit strategic

²⁷ 270 HC Deb., 5s, 1931–2, c. 632.

²⁸ See Uri Bialer, *The Shadow of the Bomber: The Fear of Air Attack and British Politics 1932–1939* (London: Royal Historical Society, 1980).

²⁹ 'Inquiry into air disarmament policy, report', CP 152 (32), 9 May 1932, CAB 16/106, TNA.

bombing, the Air Staff arguing successfully that no reliance could be placed on the observance of 'artificial laws of war'.³⁰

One problem with banning bombers would have been that civil airliners could be converted to military purposes. Indeed, in 1921 Trenchard had pointed out to ministers that aircraft then used by French civil aviation companies were drawn from war stocks of bombers.³¹ Germany was able to produce formidable aircraft by subsidising its aircraft industry and the national airline, Lufthansa. The latest German airliner in 1932 was a tri-motor monoplane, the Junkers Ju 52, which was later used as a bomber/transport by the *Luftwaffe* and was rated by the Air Ministry as superior in speed, range and bomb load to the RAF's first monoplane heavy bomber, the Fairey Hendon. German civil monoplanes visiting British airports were sometimes faster than British biplane fighters, causing concern to British ministers discussing defence requirements in 1935.³²

Policymakers faced uncertainty, not least in what form air attacks might take. The Air Staff in 1921 warned that, in addition to high-explosive and incendiary bombs, gas or even bacteriological weapons might be used.³³ The use of poisonous gas was prohibited by article V of the Washington Convention, and the Treasury representative on the CID enquired in 1922 whether it was necessary to maintain the gas experimental station at Porton in the light of that prohibition. Churchill, then secretary of state for the colonies, thought that it would be most unwise to abandon research into gas warfare, especially as neither Germany nor the Soviet Union had signed the Washington Convention, and the CIGS, the Earl of Cavan, pointed out that the research was required not only for military and naval warfare but also for protecting civilians who might be attacked from the air. It was agreed that research at Porton should continue.³⁴ Air raid precautions against gas attack were a major concern; for example, gas-masks were prepared for the civil population and techniques were developed for decontaminating areas over which mustard gas had been sprayed. By 1939 defensive measures

³⁰ CP 152 (32). For delays to new heavy bombers, see remarks by the CAS, Sir Edward Ellington, as recorded in minutes of Ministerial Committee on Defence Requirements, 10 May 1935, CAB 27/508, TNA. For Britain's successful defence of the bomber at Geneva, see Phillip Meilinger, 'Clipping the bomber's wings: the Geneva disarmament conference and the Royal Air Force, 1932-1934', *War in History*, 6 (1999), 306-30.

³¹ 'Vulnerability of British Isles to air attack', CID paper 102-A, 8 Nov. 1921, CAB 3/3, TNA.

³² 'Interim report by Ministerial Sub-committee on Air Parity', DCM (32) 41, 8 May 1935, CAB 27/518; Ministerial Committee on Defence Requirements minutes, 10 May 1935, CAB 27/508, TNA.

³³ CID paper 102-A, CAB 3/3, TNA. ³⁴ CID minutes, 28 July 1922, CAB 2/3, TNA.

against gas had progressed more than the offensive use of gas, and public concern switched to lack of provision of shelters against high-explosive bombs.³⁵

Another uncertainty concerned the future rate of technical progress in different aspects of air warfare. The Haldane Committee on Anti-Aircraft Research concluded in 1925 that, although there would be developments from time to time in the engine power, speed, climb and manoeuvrability of fighters, it was reasonable to assume that similar progress would occur in the design and performance of bombers, and that no relative improvement could be anticipated in defensive aircraft. That conclusion also applied to unmanned aircraft controlled by wireless, which were then the subject of research. Similarly, improvements in anti-aircraft guns were likely to be matched by corresponding improvements in attacking aircraft.³⁶

The relative performance of bombers and fighters varied over time. For example, in 1926 the French began large-scale production of the Bréguet 19 day bomber with a maximum speed of 149 m.p.h., almost as fast as contemporary British fighters. However, British fighter design drew ahead with the Bristol Bulldog, which entered service in 1929, with a maximum speed of 174 m.p.h., followed in 1931 by the Hawker Fury with a maximum speed of 207 m.p.h. Both types were biplanes and their improved performance mainly reflected the increased power of engines developed by the Bristol and Rolls-Royce companies respectively. A revolution in aircraft design occurred in the 1930s because, as the power of engines increased, wind resistance became more important in determining performance, and monoplanes with retractable undercarriages began to displace biplanes with fixed undercarriages. In January 1933 the American army ordered Martin B-10 twin-engined monoplane bombers with retractable undercarriages, and the Germans followed in 1935 with the Heinkel He 111 and other machines capable of carrying 3,000 pounds of bombs at speeds that gave them a good chance of eluding the RAF's biplane fighters. By February 1936 the Air Staff wanted to order monoplane fighters as soon as the Hawker Hurricane and Supermarine Spitfire had been tested.³⁷ Fighter Command replaced most of its biplanes with monoplanes in 1938–9, retaining only the obsolescent Gloster Gladiator at the outbreak of war. The combination of the monoplane airframes and the Rolls-Royce Merlin engine made the RAF machines capable of intercepting the fastest German bombers. The

³⁵ Terence H. O'Brien, *Civil Defence* (London: HMSO, 1955).

³⁶ 'Anti-aircraft research committee: interim report', 23 Dec. 1925, CAB 16/67, TNA.

³⁷ Secretary of State's progress meeting, 6 Feb. 1936, AIR 6/24, TNA.

British were slower than the French and Germans to adopt cannon firing explosive shells, which were more destructive and had longer range than rifle-calibre machine guns. Even so, Hurricanes and Spitfires were adequately armed with eight machine guns, compared with the two carried by pre-1937 fighters or the Gladiator's four.³⁸

The chances of successful interception depended upon locating the enemy. In 1924 a joint Air Ministry and War Office committee under Major-General C. F. Romer recommended a system of observation posts, those on the coast being provided with sound-detectors to locate the approach of aircraft before they could be seen from land. However, the speed of sound is a constant, whereas the speed of aircraft was increasing, shortening the period of warning given by sound-detectors. The first successful experiments with what was then known as radio direction finding, and which became known as radar, were conducted in 1935 and between the autumn of 1936 and the spring of 1939 a chain of radar stations was constructed from the Isle of Wight to Dundee. Britain was a world leader in this aspect of air defence but the effectiveness of the new technology depended on an efficient system of air raid reporting. Such a system had already been set up following a report of the CID's Home Defence Committee in 1929, which recommended that all relevant intelligence should be reported to the RAF's headquarters for the air defence of Great Britain, where, as in the First World War, it was set out on a single plotting table. Command and control was improved by the development of radio communication between ground and air. Anti-aircraft guns, searchlights and balloon barrages again formed fixed defences but, although the anti-aircraft guns of the late 1930s had better range than their predecessors, accuracy was not improved dramatically until radar directional control was introduced during the Second World War. The United Kingdom's air defence system was the best in the world in the early 1930s, but crucial improvements occurred in the last twelve months of peace. Only five out of thirty fighter squadrons had completed conversion to Hurricanes by the Munich crisis in September 1938, and they had problems firing their guns at the temperatures encountered above 15,000 feet, and no Spitfires were yet in service. Radar cover was then limited to the coast between Dungeness and the Wash. By the summer of 1939, however, the technology of air war had moved decisively in favour of defence.³⁹

³⁸ Note by Sir R. Sorley, reproduced in M. M. Postan, D. Hay and J. D. Scott, *Design and Development of Weapons: Studies in Government and Industrial Organisation* (London: HMSO, 1964), pp. 537–42.

³⁹ John Ferris, 'Fighter defence before Fighter Command: the rise of strategic air defence in Great Britain, 1917–1934', *Journal of Military History*, 63 (1999), 845–84;

Even earlier, notwithstanding Baldwin's rhetoric in 1932, the Air Staff never thought that *every* bomber would always get through. However, the Air Staff believed in what the Baldwin Committee called the 'well-established principle that attack is the best form of defence', including counter-attack against air bases and other objectives in enemy territory. The number of fighter aircraft was kept at the minimum believed to be necessary for defence, a number that rose from 1935 as the range of aircraft increased and more of the country became vulnerable to air attack.⁴⁰ In February 1935 there was some discussion in the CID about whether the power of air forces to deliver a 'knock-out blow' had been exaggerated (the CIGS, Montgomery-Massingberd, thought it had). The CAS, Sir Edward Ellington, said that if by knock-out blow one meant a period of 24 hours, then it would not be possible at present to paralyse a country. On the other hand, a nation that seized the initiative might deal a blow from which its victim might be unable to recover.⁴¹ In October 1936 the CID agreed that the basic assumption for anti-aircraft defence should be that Germany might attempt a knock-out blow and that air attacks would be delivered with the maximum intensity at the outbreak of war.⁴² The Air Staff accepted the implication that the scale of operations of fighter squadrons would be dictated by the enemy and that consequently these squadrons must be able to operate continuously with 100 per cent reserves, whatever economies might be made elsewhere.⁴³ By July 1937 progress with radar was already regarded in the Air Ministry as satisfactory and two months later Hankey was advising Inskip that reports of the CID Sub-Committee on Air Warfare in Spain did not bear out 'the tendency to think that the bomber will always get through' and that the combination of fighters, guns and searchlights 'might prove very much more effective than we have hitherto assumed'.⁴⁴

Nevertheless, the Air Staff never abandoned its faith that strategic bombing was the best way to employ air power. The Air Staff argued

T. C. C. James, *The Growth of Fighter Command 1936–1940*, ed. Sebastian Cox (London: Frank Cass, 2002), pp. 41–51; Alexander Rose, 'Radar and air defence in the 1930s', *Twentieth Century British History*, 9 (1998), 219–45; David Zimmerman, *Britain's Shield: Radar and the Defeat of the Luftwaffe* (Stroud: Sutton Publishing, 2001), pp. 83–7, 89–90, 156–72.

⁴⁰ 'Inquiry into disarmament policy', CP 152 (32), CAB 16/106, TNA; James, *Growth of Fighter Command*, pp. 1–3, 12–13, 19, 25, 31.

⁴¹ CID minutes, 25 Feb. 1935, CAB 2/6(1), TNA.

⁴² CID minutes, 29 Oct. 1936, CAB 2/6(1), TNA.

⁴³ Minutes of Inskip's review of defence, 2 Nov. 1937, T 161/855/S.48431/04, TNA.

⁴⁴ Lord Swinton (secretary of state for air) to Sir John Simon (chancellor of the exchequer), 12 July 1937, T 161/855/S.46431/01/2; Hankey to Inskip, 27 Sep. 1937, CAB 64/3, TNA.

that long-range air attack by bombers could by-pass the enemy's defences and destroy his productive capacity and his morale, preparing the way for the defeat of the enemy's armed forces, or even making their defeat unnecessary if the enemy's morale gave way first. RAF thought appears to have owed little or nothing to the theoretical study *The Command of the Air*, by Giulio Douhet, whose arguments in favour of strategic bombing were considered to be important by the US Army Air Corps as well as by the *Regia Aeronautica* of his native Italy. The British had plenty of experience of air war of their own to draw on. Moreover, strategic bombing provided the rationale both for the creation of the RAF in 1918 and for its continued existence as a separate service, whereas an emphasis on tactical bombing or anti-submarine patrols would have pointed towards a de-merger into a restored RFC and RNAS.⁴⁵ Trenchard and his successors as CAS emphasised the deterrent power, and therefore defensive value, of strategic bombing. However, funds were short, and it was cheaper to equip squadrons with day bombers like the Hart. Moreover, until the German air force was recreated there was no long-distance target for which a strategic bombing force could have been prepared. The introduction into service of the RAF's first monoplane heavy bomber, the Hendon, was delayed until 1936, five years after its first flight, on account of the Geneva Disarmament Conference, and with its fixed undercarriage the Hendon was obsolescent, its sole modern feature being the power-operated turret in its nose. This form of armament had been pioneered by the French, and the Air Staff had hopes that well-armed bombers would be able to defend themselves against fighters. Certainly the turrets brought a great improvement in gunnery target strikes compared to earlier hand-held machine guns, especially as the slipstream increased with higher aircraft speeds. Unfortunately the turrets fitted on RAF bombers in the 1930s and for almost all of the war had rifle-calibre machine guns that were outranged by the cannon fitted to German fighters from 1938.⁴⁶ On the other hand, German bombers, which relied mainly on speed to evade fighters, were just as vulnerable to British fighters as British bombers were to German fighters.

The lack of a suitable strategic bomber led the Air Ministry to short-circuit normal testing of prototypes before placing orders. The Armstrong Whitworth Whitley, the Handley Page Hampden and the Vickers

⁴⁵ Giulio Douhet, *The Command of the Air* (Washington: Office of the Air Force History, 1983), p. ix; John Buckley, *Air Power in the Age of Total War* (London: UCL Press, 1999), pp. 74–8; Malcolm Smith, *British Air Strategy between the Wars* (Oxford: Clarendon Press, 1984), pp. 53–75.

⁴⁶ Postan, Hay and Scott, *Design and Development*, pp. 112–13.

Wellington did not fly until 1936, but were introduced into service in 1937–8. Inevitably there were teething problems, and production was often held up by the need to make modifications. Nevertheless, the speed with which biplanes disappeared from squadron service was remarkable. In June 1937 only four out of fifty-seven bomber squadrons were completely equipped with monoplanes, although another eleven had begun to convert to monoplanes; by September 1939 all of the biplanes had been replaced.⁴⁷ On the other hand, this rapid modernisation was brought about by producing large numbers of machines that could not, in terms of range or striking power, properly be called strategic bombers. The Bristol Blenheim and the Fairey Battle, both introduced into service in 1937, had too limited a range to reach the Ruhr from England. The Battle was really an unsuccessful experiment in producing what was then termed a medium bomber with one engine rather than two. However, the need for political reasons to attempt to maintain numerical parity led to it being ordered in large numbers even although it was, in the words of the official history of design and development, ‘an aircraft that nobody much wanted’.⁴⁸ Indeed, it continued in production until December 1940, although the Air Staff had known in 1936 that it was unsuitable for its purpose. As late as September 1939 only twenty-eight out of fifty-five bomber squadrons had Whitleys, Hampdens or Wellingtons. All other machines, including all in service prior to 1937 and the majority down to 1939, were pseudo-strategic bombers that could not fulfil the Air Staff’s ambitions.

The use of RAF aircraft in the imperial policing role might have been expected to encourage the development of tactical bombers and doctrine, but this was not the case. Imperial policing was generally carried out by slow, general purpose machines that had to be rugged and reliable for operations over deserts and mountains, although the Hart, designed as a fast day bomber for Europe, proved to be suitable for India.⁴⁹ The Hart in its day would have been an excellent tactical bomber, as would its intended successor, the Merlin-powered monoplane Hawker Henley light bomber of 1937. However, the Henley, although faster and more agile than the similarly powered but lumbering Battle, was relegated to the modest role of target-tug for training anti-aircraft gunners. Air Staff doctrine was based on strategic bombing, and therefore the machine with the larger bomb load was preferred.

⁴⁷ Chris Ashworth, *Bomber Command 1936–1968* (Yeovil: Patrick Stephens, 1995), pp. 21, 205–8.

⁴⁸ Postan, Hay and Scott, *Design and Development*, p. 11.

⁴⁹ Omissi, *Air Power*, pp. 138–49.

Co-operation with the army was left to short-range reconnaissance machines and RAF bomber crews were not trained to intervene directly on the battlefield.⁵⁰

The long distances involved in imperial defence encouraged the development of flying boats for reconnaissance, and arguably the RAF was a leader in this field. However, co-operation with the navy was not high on the Air Staff's list of priorities, and it did not develop an anti-submarine doctrine or effective aircraft for what became Coastal Command. Some degree of co-operation with the navy was necessary regarding the equipment of the Fleet Air Arm, at least until its transfer from Air Ministry to Admiralty control in 1937, but this co-operation did not extend to agreement on how best air power could be applied to naval warfare. The bomber versus the battleship controversy, the classic inter-service dispute, is dealt with below in connection with naval armaments. It may be noted here that the RAF's case would have been more convincing if it had provided some of its long-range bomber crews with the specialised training required to attack warships, but this role was left to small numbers of specialised torpedo bombers, either carrier- or shore-based.

British warplanes did not always fulfil their potential or the Air Staff's hopes, but problems tended to arise from a mismatch of strategic or tactical doctrine with technical possibilities rather than with shortcomings in aircraft design. The traditional view that the inter-war British aircraft industry was backward has been contested by Edgerton, who has pointed to its military focus and the support it received from government. The Air Ministry was easily the largest research and development institution in the country and there were great advances in aerodynamic theory as a result of work in the universities and at the government's Royal Aircraft Establishment.⁵¹ The fact that biplanes, on the eve of rearmament, had a superficial resemblance to First World War aircraft does not justify Barnett's description of the products of the inter-war British aircraft industry as 'backward in design and construction', employing wood and fabric when America and Germany had already moved into the era of all-metal aircraft.⁵² In fact the Bristol aircraft company produced an all-metal, monoplane fighter, the Type 133, with retractable undercarriage in 1934, a year ahead of the prototype of the Messerschmitt Bf 109.⁵³ The RAF chose the Gladiator biplane in 1934

⁵⁰ Sir John Slessor, *Central Blue* (London: Cassell, 1956), pp. 166, 183, 204–8.

⁵¹ Edgerton, *England and the Aeroplane*, pp. 18–37.

⁵² Barnett, *Collapse of British Power*, pp. 213, 418.

⁵³ Peter Lewis, *The British Fighter since 1912* (London: Putnam, 1979), p. 232; William Green, *Warplanes of the Third Reich* (London: MacDonald and Jane's, 1970), p. 526.

because it could be in service sooner than the Bristol machine. Retention of the biplane format, with its greater manoeuvrability, if lower speed, was not exceptional: the Italian and Soviet air forces both had biplane fighters until 1942, and even the *Luftwaffe* had one of its thirteen day fighter wings still equipped with biplanes in September 1939.⁵⁴ British aircraft designers made use of metal from an early date, the change from wood to metal airframe having begun with the Armstrong Whitworth Siskin fighter, which entered service in 1924, and fabric-covered metal frames were standard for German as well as British fighters in the early 1930s.⁵⁵ In any case, the move from wood to metal did not necessarily represent progress: the bias of American aircraft designers in favour of metal precluded promising projects involving wood, such as the de Havilland Mosquito of the Second World War, which drew upon that firm's experience of using wood in the 1930s.⁵⁶ British aero-engine firms, particularly Rolls-Royce and Bristol, were so far from being backward in 1935 that the prototypes of the Messerschmitt Bf 109 fighter and the Junkers Ju 87 Stuka dive bomber were fitted with Rolls-Royce engines in that year because German firms had lagged behind their British counterparts.⁵⁷

One notable aspect of the revolution in aircraft design in the mid-1930s was a sharp increase in the prices of all types. Table 3.1 is based on estimates made by the Air Ministry in 1937 and although the figures are expressed in current prices they are reasonably comparable, since retail prices were generally lower in 1937 than in 1924.⁵⁸ As light bombers like the Hart and Hind were replaced by larger machines like the Battle and Blenheim in 1937, the unit cost rose by about three times. The larger medium bombers of 1939, the Hampden and Wellington, were expected to be more expensive than earlier heavy bombers. Nor was a slackening in the increase in costs in sight. The four-engined bombers like the Halifax that the Air Staff wished to order in 1939 were estimated to cost 40 per cent more than the current twin-engined heavy bomber, the Whitley. In contrast, unit costs of both aircraft and

⁵⁴ John Killen, *The Luftwaffe: A History* (London: Frederick Muller, 1967), p. 95.

⁵⁵ A. J. Robertson, 'The British aircraft industry and the state in the interwar period: a comment', *Economic History Review*, 28 (1975), 648–57.

⁵⁶ Eric Schatzberg, *Wings of Wood, Wings of Metal: Culture and Technical Choice in American Airplane Materials, 1914–1945* (Princeton University Press, 1999).

⁵⁷ Green, *Warplanes of the Third Reich*, pp. 42–4, 168–9, 428, 526.

⁵⁸ The nearest thing available to a retail price index in the inter-war period, the Ministry of Labour's working-class cost of living index, is not a good price deflator as it was based on Edwardian consumption patterns. More significant regarding relative prices of aircraft is the fact that average money wages – the major input – were stable from 1924 and were no higher in 1936 than in 1929.

Table 3.1. *Costs of aircraft, 1924–39 (£ at current prices)*

<i>Fighters</i>		
1924	Siskin	4,050
1930	Bulldog	4,200
1934	Fury	3,900
1937	Gladiator	5,300
1939	Spitfire	8,000
1939	Defiant	10,500
<i>Light bombers</i>		
1924	DH 9A	3,300
1930	Hart	4,050
1937	Hind	4,150
<i>Medium bombers</i>		
1937	Battle	11,250
1937	Blenheim	13,500
1939	Hampden	20,000
1939	Wellington	18,500
<i>Heavy bombers</i>		
1924	Virginia	13,300
1934	Heyford	13,750
1937	Whitley	30,000
1939	Halifax	42,000

Sources: 'Defence expenditure in future years: summary of forecasts submitted by the defence departments', 22 Oct. 1937, CAB 24/272, TNA.

warships had been relatively stable between the mid-1920s and the mid-1930s: for example, a biplane fighter cost 3.7 per cent less in 1934 than in 1924, and a class of cruisers of about 7,000 tons completed between 1933 and 1935 cost 8.8 per cent less on average than a class of 7,500-ton cruisers completed in 1926.⁵⁹

Naval weapons

In 1919 the Naval Staff argued that aircraft were in their infancy and that the battleship could not be dispensed with for the foreseeable future: 'the country whose fast capital ships and their complementary units are not contained or held by similar enemy ships can, with these vessels, sweep the enemy ships and sea-borne trade off the sea'.⁶⁰

⁵⁹ Data for cruisers from *Jane's Fighting Ships 1936* (London: Sampson Low, Marston & Co, 1936), pp. 51–2.

⁶⁰ 'Some notes by Naval Staff for First Lord's speech on the naval estimates: the retention of capital ships', 24 Nov. 1919, Admiralty records, series 116, file 1677 (ADM 116/1677), TNA.

Complementary units included aircraft carriers. Naval historians have tended to assume that the Admiralty was irrationally attached to battleships and allowed Britain to fall behind in naval aviation. Edgerton, however, has pointed out that in 1935 Britain had six carriers compared with four each for the United States and Japan, and would have had more than either of these powers at the beginning of the Pacific War in 1941 had it not been for wartime losses.⁶¹ The lead over European powers was much greater: in 1939 France had only one flush-decked carrier, which was too slow for a fleet action, and the German and Italian navies had none in service. The Admiralty's commitment to naval aviation was indicated by the fact that as many aircraft carriers (five) were launched between 1937 and 1940 as battleships. Opposition to building carriers came not from conservative admirals but from the Air Ministry, which claimed that land-based aircraft would be better value for money. This interdepartmental dispute gave the Treasury the opportunity to delay the laying down of the first of the new carriers, the *Ark Royal*, until 1934, when the First Lord, Sir Bolton Eyers-Monsell, was provoked by the Air Ministry's claim to remark that 'six-inch guns ashore would cost only a fraction of the cost of a ship mounting guns of the same calibre – but we cannot on that account do without the ship'. The Treasury conceded that the Admiralty had got the better of the argument.⁶²

The inter-war bomber versus the battleship debate in Whitehall was largely, although not entirely, an interdepartmental dispute over resources at a time when the Treasury was trying to reduce the annual estimates. In November 1920 the Admiralty estimated that the construction of four new capital ships would cost £37,500,000.⁶³ In the event, these 48,000-ton monsters were cancelled under the Washington naval treaty and replaced by two 35,000-ton battleships. Even these 'Nelson'-class vessels cost £7.5 million each, at a time when the naval estimates were being reduced from £80.8 million in 1922/3 to £52.6 million in 1924/5. The Air Ministry's estimates in 1922/3 amounted to only £9.4 million. The Admiralty's request to proceed with new capital ships in 1920 prompted an enquiry by a CID sub-committee on Naval Shipbuilding, chaired by Bonar Law. Most of the witnesses agreed that the development of aircraft had not yet reached a stage where the battleship was obsolete. Bonar Law attached particular importance to Trenchard's evidence that aircraft were still ineffective against a capital

⁶¹ Edgerton, *Warfare State*, pp. 30–2.

⁶² Eyers-Monsell to Sir Philip Sassoon (Air Ministry), and notes by Bridges, 4 Oct. and 11 Oct. 1934, T 161/624/S.36130/34, TNA.

⁶³ 'Naval policy and construction', CP 2176, 22 Nov. 1920, CAB 24/124, TNA.

ship, although the CAS clearly believed that the air threat would grow. Naval advocates of torpedo bombers and carriers argued that research into these weapons would be a better investment than construction of battleships. Such views were stoutly opposed by Chatfield, then assistant chief of the Naval Staff, who argued that ships with armoured decks designed to withstand plunging 16-inch shells from other capital ships, and 'bulges' to absorb torpedoes fired from submarines, would resist any bombs carried by aircraft.⁶⁴ The enquiry did not accept the radical case against the battleship, but trials were carried on from 1921 into the effectiveness of armour against bombs, and 'bulges' against near misses by bombs or aerial torpedoes, and into the accuracy of bombing (using a radio-controlled, but slow-moving old battleship) and of anti-aircraft guns (using slow, unmanned target aircraft), without producing an interdepartmental consensus. The debate only acquired urgency in 1936, when the moratorium on capital ship construction, agreed at Washington and extended in 1930 at the first London naval conference, was about to end.

In March 1936 a CID sub-committee was appointed to consider the vulnerability of capital ships to air attack, in the light of experiments since 1921, with Inskip in the chair, and Chatfield, now first sea lord, and Ellington, the CAS, as his expert advisers. Chatfield's view, as in 1921, was that no warship was unsinkable but there was no reason why capital ships could not be designed to withstand air attack. Ellington thought there was a tendency in the sub-committee's discussions for the capital ship of the future to be pitted against the aircraft of today, whereas the air threat would increase very rapidly. On the question of relative price, the Admiralty and the Air Ministry agreed that forty-three twin-engined medium bombers could be built and maintained for the cost of one capital ship over a given period (aircraft would have had to be replaced more frequently). Inskip did not accept, however, that such aircraft could be substituted for battleships. Given the need to protect Britain's world-wide trade and empire, there was a need for ships equal in fighting power to the enemy that could operate in the oceans far beyond the range of land-based aircraft. He felt that Britain had more to lose by making a wrong decision in this matter than other naval powers, yet none of them proposed to dispense with battleships. He accepted that it was extremely difficult to conduct tests in peace that would be sufficiently realistic to be conclusive, but urged that the Admiralty and

⁶⁴ Geoffrey Till, 'Airpower and the battleship in the 1920s', in Bryan Ranft (ed.), *Technical Change and British Naval Policy 1860-1939* (London: Hodder and Stoughton, 1977), pp. 108-22, at pp. 111-13.

Air Ministry should collaborate in further trials aimed at obtaining information that would enable capital ships to be designed so as to secure the maximum immunity from air attack.⁶⁵

Given uncertainty whether all other naval powers would observe the 35,000-ton limit first set at Washington in 1922, and renewed by Britain, France and the United States at the second London naval conference in 1936, there was doubt whether the new capital ships due to be laid down in January 1937 would be equal in fighting power to a potential enemy. The signatories of the second London naval treaty agreed on 14-inch calibre as the maximum size of gun, but the Japanese refused to state their intentions and the Americans then opted for a 16-inch gun. However, the British had already designed mountings for 14-inch guns and, as the construction of gun mountings determined how soon a capital ship could be completed, Chatfield decided to go ahead with 14-inch guns for the 'King George V' class. Speed of construction seemed to be of the essence, given that all except three of the Royal Navy's capital ships were at least twenty years old, and the fact that France, Germany and Italy were already building new ones. The completion of the 'King George V' class was, however, delayed by Chatfield's insistence on extra armour, which necessitated the redesign of one of the turrets to take two rather than four guns, to save weight.⁶⁶ The consequence was that Britain's new capital ships had smaller calibre guns than those constructed by the Italians, Germans or Japanese, but this was probably inevitable, given that the British observed the 35,000-ton limit and the Germans and Japanese did not.

Cruisers were considered by the Naval Staff to be the major threat to British trade, and also the means by which a *guerre de course* could be conducted against Japan. The Germans sprang a surprise in the early 1930s when they began to replace their pre-dreadnoughts with so-called pocket battleships. These armoured ships were nominally within the 10,000-ton limit set by the Treaty of Versailles, but in reality displaced 20 per cent more. They were designed as commerce raiders, with sufficient speed to evade all capital ships, except battle-cruisers, but with more powerful guns (11-inch) than any allowed to cruisers under the Washington treaty (maximum 8-inch). However, the Admiralty gave greater priority to the Japanese menace. When asked in the DRC in

⁶⁵ 'Sub-Committee on the Vulnerability of Capital Ships to Air Attack, report', CID paper 1258-B, 30 July 1936, and minutes of evidence, CAB 16/147, TNA. An abridged version of the report was published as Cmd 5301 (PP 1936-7, xii. 73-90).

⁶⁶ Chatfield to Churchill, 10 Mar. 1942, Chatfield Papers, CHT/4/3, National Maritime Museum, Greenwich; G. A. H. Gordon, *British Seapower and Procurement between the Wars: A Reappraisal of Rearmament* (Basingstoke: Macmillan, 1988), p. 173.

January 1934 by Hankey and Fisher about the pocket battleships, Chatfield replied that the French (who had laid down the first of two battle-cruisers in 1932) could look after them. He added that Britain's three battle-cruisers could do so too, but ultimately the Royal Navy might not possess any ships of that type as the design of their replacements would depend upon what the Japanese replaced their battle-cruisers with.⁶⁷ No attempt was made to build larger cruisers to cope with the pocket battleships. Indeed, the Admiralty proposed at the second London naval conference to *reduce* the maximum size of cruisers, from the 10,000 tons allowed under the Washington treaty to 8,000 tons, to make it possible to build at less cost the number believed to be required to protect British trade.⁶⁸

The need for economy also influenced Admiralty thinking on anti-submarine warfare. On being appointed first sea lord, Chatfield made a start to building a reserve of anti-submarine vessels, equipment and trained personnel to form a nucleus for the anti-submarine force that would be required in war. However, in a period of severe financial restraint his only change in the Admiralty's sketch estimates for 1933 was to raise the number of anti-submarine escorts to be laid down from one to two.⁶⁹ When Fisher asked in the DRC in January 1934 whether the navy had enough destroyers for anti-submarine work, Chatfield said that the number could be increased by refraining from scrapping old vessels, if the Germans started building submarines again. He also declined to take up Fisher's suggestion that the Admiralty should put in a claim for all the Asdic (Sonar) sets required in war, instead of asking for 200 and waiting for others to be manufactured subsequently.⁷⁰ Germany had already taken secret steps to re-create a submarine force and the Admiralty was not entirely surprised to learn that U-boats were already under construction when Hitler denounced the arms limitation clauses of the Treaty of Versailles in March 1935. Even so, the Admiralty continued to give a higher priority to major warships than to anti-submarine vessels, on the grounds that the latter could be produced quickly in an emergency. By 1934 the Admiralty had designed an anti-submarine trawler capable of rapid construction and in October 1938 it was decided to build a new type of ship that would be cheaper than conventional destroyers, but faster than existing designs of escort

⁶⁷ DRC minutes, 23 Jan. 1934, CAB 16/109, TNA.

⁶⁸ Stephen Roskill, *Naval Policy between the Wars*, 2 vols. (London: Collins, 1968–76), vol. II: *The Period of Reluctant Rearmament 1930–1939*, p. 317.

⁶⁹ Chatfield's comments on 'Naval policy and the sketch estimates for 1933', 30 Aug. 1932, CHT/3/1, National Maritime Museum, Greenwich.

⁷⁰ DRC minutes, 18 Jan. and 23 Jan. 1934, CAB 16/109, TNA.

vessels.⁷¹ The Royal Navy was ahead of the US Navy in fitting Asdic to all destroyers from 1932 as well as to older ones earmarked for escort duties.

The development of the Royal Navy's own submarines was restricted by the need for economy, although insofar as economy led to standardisation of design it was not without benefit. There had been five different kinds of submarine in service in 1918: patrol, fleet, minelayer, monitor and anti-submarine. The last two types were quickly discontinued and, although examples of the other types were still in service in 1939, only the patrol type was under continuing development. Increasing concentration on patrol submarines capable of laying mines as well as reconnaissance and anti-warship patrols was the best use of scarce resources.⁷²

On balance, it is clear that the Royal Navy did not cease to be a technical leader in the inter-war period. Geoffrey Till has argued that the British were less perceptive than the Japanese or the Americans in their understanding of what naval aviation could achieve, but, as he says, the difference was only one of degree.⁷³ In other respects the Royal Navy was clearly ahead. The development of Asdic had been kept secret even from Allied navies in the First World War and Britain still had a strong lead in 1939.⁷⁴ The Royal Navy was also participating in the development of radar from 1935, and the first sets were installed in a cruiser in 1938. Britain was thus well placed to exploit electronic technology, which came to dominate naval warfare in the Second World War, both as regards tracking an enemy (as with the shadowing of the battleship *Bismarck* in 1941) and fighting at night.⁷⁵

Army weapons

Britain continued to lead the world in the development of tanks during the 1920s. The Vickers Medium Mark I, deliveries of which began in 1923, was the first British tank in service to have a revolving turret. The Mark III of 1928 was well ahead of its time, having the firepower of a heavy tank but the speed of a medium one. However, because of its high

⁷¹ First Sea Lord, Sir Roger Backhouse, to Inskip, 13 Oct. 1938, ADM 205/3, TNA.

⁷² David Henry, 'British submarine policy, 1918–1939', in Ranft (ed.), *Technical Change and British Naval Policy*, pp. 80–107.

⁷³ Geoffrey Till, 'Adapting the aircraft carrier: the British, American and Japanese case studies', in Williamson Murray and Alan R. Millett (eds.), *Military Innovation in the Interwar Period* (Cambridge University Press, 1996), pp. 191–226.

⁷⁴ George Franklin, *Britain's Anti-Submarine Capability 1919–1939* (London: Frank Cass, 2003).

⁷⁵ Alan Beyerchen, 'From radio to radar', in Murray and Millett, *Military Innovation*, pp. 265–99, at p. 294.

cost, only three examples were built and the type was not developed. Instead the army concentrated on light tanks, initially of 4.25 tons, little more than a quarter of the size of the Medium Mark III. Armed only with machine guns, they were of no use in tank-to-tank combat, but they could be built cheaply and issued for training. An identical policy was followed by the German army when it adopted the *Panzerkampfwagen 1*, with similar characteristics to the British Light Tank Mark VI, in 1934. Reliance upon light tanks was not a sign of technical backwardness. Indeed, British tanks were widely exported or produced under licence abroad in the inter-war period; for example, Italy based its standard light tank down to 1941 on a British model of 1929.

Whereas the United States abolished its tank corps at the end of the First World War, the Royal Tank Corps (RTC), as it became in 1923, survived and engaged in a good deal of experiment. Indeed, until the early 1930s the British army was widely regarded as the world leader in developing doctrine for tank warfare. This reputation was not entirely deserved. For example, Fuller, who was the best-known British radical military thinker of the 1920s, successfully converted the RTC to the doctrine of firing on the move in tank-to-tank combat. The Germans adopted the opposite tactic of firing when stationary, which made for much greater accuracy. From 1927 the British army conducted experiments to discover how tanks could best be combined with armoured cars, motorised machine guns and artillery, and aircraft, but the conclusion drawn was that tanks were best employed in independent brigades, rather than in units combining different arms, in contrast to what the Germans were to do with their panzer divisions.⁷⁶ By late 1933 the British army had an armoured brigade as part of its establishment, but the composition of the brigade had yet to be decided, pending experiments with new medium tanks, especially as regards their resistance to anti-tank guns. The cavalry division was still mounted on horses and would remain so, in the words of the DRC report in February 1934, 'until a vehicle is designed capable of replacing the horse, and no such vehicle is in sight'.⁷⁷ The vulnerability of horsed cavalry to modern firepower was recognised, but tanks were as yet characterised by short range and limited mechanical reliability, and armoured cars lacked cross-country capability. Nevertheless, in October 1934 the CIGS, Montgomery-Massingberd, decided that one of the army's two horsed cavalry brigades should be given tanks, and combined as a mechanised

⁷⁶ Harris, *Men, Ideas and Tanks*, pp. 197–204, 215–29, 246–8.

⁷⁷ 'Defence Requirements Sub-Committee, report', DRC 14, 28 Feb. 1934, CAB 24/247, TNA.

cavalry brigade with the army's sole existing tank brigade to form a 'mobile' (armoured) division.⁷⁸ In the absence of any satisfactory alternative, the mechanised cavalry were equipped with light tanks. Conversion of other horsed cavalry regiments followed and, contrary to what many military historians have assumed, the limiting factor was the availability of armoured fighting vehicles rather than sentimental attachment to horses.⁷⁹

Teething troubles and indecision about the best balance between armour and speed led to hesitation in adopting a successor to the obsolescent medium tanks dating from the 1920s. Design work was delayed by the death of Sir John Carden, Britain's leading tank designer, in an aeroplane crash in 1935. The limited resources of Vickers-Armstrong, Britain's only producer of tanks after it took over the Carden-Loyd firm in 1928, were further stretched when the War Office decided in 1936 on a re-equipment programme based on no fewer than four categories of tank. These were to be: a light tank for the cavalry; a larger 'cruiser' tank, armed with a 2-pounder shell-firing gun, but fast enough for the light tank role in the Tank Brigade; a similarly armed, but more heavily armoured medium tank for the 'hitting' role in the Tank Brigade; and a heavily armoured, slow assault tank to operate with the infantry. The Cruiser Mark I was not ready for production until August 1937, and was considered to be too vulnerable to anti-tank guns; the more heavily armoured Mark II was not ready for production until July 1938. Neither the Mark I nor the Mark II was suitable for mass production by non-specialist firms and both were regarded as stop-gaps. The Cruiser Mark III was developed by the Morris Car Company, using the suspension of the American Christie tank, but suffered from many teething problems and did not enter production until December 1938. The medium tank remained a research project. The Infantry Tank Mark I was not ready for production until April 1937 and, being armed only with a single machine gun, was not designed for tank-to-tank fighting. This drawback was overcome with the Mark II, which had a 2-pounder gun, but the pilot model did not appear until April 1938 and production did not start until the following year. The British tanks of the late 1930s were comparable in fighting power to their German equivalents, but not in mechanical reliability, reflecting their hurried development.⁸⁰ Tanks suitable for use by armoured divisions in a campaign on the European

⁷⁸ Minute by CIGS, 15 Oct. 1934, WO 32/2847, TNA.

⁷⁹ David French, 'The mechanization of the British cavalry between the world wars', *War in History*, 10 (2003), 296–320.

⁸⁰ Postan, Hay and Scott, *Design and Development*, pp. 240, 309–13, 316; Harris, *Men, Tanks and Ideas*, pp. 240–1; 'Tank situation statements made to the DPR

continent were not going to be available in quantity until 1939 at the earliest, whatever decisions were to be taken about the army's role in 1934 or in 1937.

The position about field artillery was dominated for most of the period by the huge stocks of guns and ammunition left over from the First World War. Field artillery units down to the mid-1930s were equipped with the old 18-pounder and 4.5-inch howitzer, both of which had been out-ranged by equivalent guns of continental armies and were no longer, in the War Office's view, 'fit for war'.⁸¹ A specification had been issued in May 1934 for a weapon to take the place of both the 18-pounder and the howitzer, and this led to the excellent 25-pounder used in the Second World War. Satisfactory trials were held in October 1938 and orders placed forthwith. Meanwhile existing stocks of 18-pounders were converted to 25-pounders by relining them and modifying the carriage, and stocks of 60-pounder medium guns were also modernised by being provided with a loose liner, developments that were described as 'winners' by the CIGS, Sir Cyril Deverell, and the Master-General of the Ordnance, Sir Hugh Elles. The 2-pounder tank gun was adopted as an anti-tank gun in 1934 and was superior to its German 37-mm equivalent; however, as early as April 1938 it was recognised that there would probably be a requirement for a heavier anti-tank gun to cope with increasing armour, and a new 6-pounder had reached the wooden mock-up stage by September 1939.⁸² The artillery and infantry were completely motorised in the 1930s – in contrast to continental European armies, including the German army, where horses continued to be widely used during the war. The British army was modernised between 1936 and 1939, but the low priority given to it compared with the air force and navy meant that there continued to be deficiencies, especially as regards guns and tanks, and there was a lack of equipment even for training.⁸³

The economy and finance

What economic and financial factors prevented Britain from creating and maintaining an air force equal to any other within striking distance

Sub-Committee, May 1937–May 1938', WO 332/4441; Army Council – Informal Meetings, 13 July and 20 July 1937, WO 163/47, TNA.

⁸¹ 'Organisation, armament and equipment of the army', DPR 145, 16 Nov. 1936, CAB 64/35, TNA.

⁸² Postan, Hay and Scott, *Design and Development*, pp. 247, 257–9, 261–2, 315–16; correspondence between CIGS and the Master-General of the Ordnance, 24 Feb. 1937, WO 32/4385; 'Anti-tank equipment', WO 32/4684, TNA.

⁸³ *The Ironside Diaries 1937–1940*, ed. Roderick Macleod and Denis Kelly (London: Constable, 1962), pp. 53–4, 56–60.

of the United Kingdom? Or maintaining a navy capable of defending Britain's interests in the Far East from the 1920s, while also dealing with the German and Italian navies from 1935 and protecting Britain's worldwide trade routes? Or creating an army capable of co-operating with European allies, while also defending Britain's overseas territories and interests? Merely to list Britain's defence requirements is to show that not all could be met, and that therefore strategic choices would be necessary.

Table 3.2 shows the course of expenditure by the three defence departments. The figures for the financial years 1919/20 to 1922/3 include the cost of the aftermath of the war and are not therefore strictly comparable to the years that followed. Those for 1939/40 include the cost of operations from September 1939 to March 1940, but these were limited in scope and in July 1939 the Treasury expected total defence expenditure to reach £750 million in the current financial year, even if there were no war.⁸⁴ The percentage figures in column 2 show what share of current national output went to the defence departments, but when reading them one should remember that GDP at current prices was affected by a fall in prices in most years from 1920 to 1932, and by severe falls in output between 1920 and 1921, and between 1929 and 1932. On the other hand, GDP at current prices rose sharply between 1935 and 1937 and again between 1938 and 1939. The percentage figures reflect changes in the denominator as well as the numerator, and give an impression that defence expenditure rose more slowly than it did after 1934. On the other hand, the figures for expenditure in column 1 include the effect of prices rising in response to increased demand for equipment after 1936. For example, a light tank that cost £3,250 in October 1936 cost £4,000 in March 1938. Prices on Admiralty contracts increased by about 7 per cent between 1937 and 1938, although wholesale prices were falling and average money wage rates increased by only 1.2 per cent between these years.⁸⁵

Notwithstanding these caveats, table 3.2 shows clear trends. Defence expenditure stabilised after 1923, even rising in some years and, measured as a percentage of GDP, was not much lower between 1923/4 and 1927/8 than between 1906/7 and 1913/14 (see table 1.1). From 1928/9 to 1932/3 there was a clear downward trend, with no significant recovery until 1935/6, and the percentage figures were stable only because of the

⁸⁴ 'Note on financial situation', CP 149 (39), 3 July 1939, CAB 23/100, p. 138, TNA.

⁸⁵ G. Oram to E. Compton, 23 Mar. 1938, T 161/822/S.35177/38; Captain V.H. Danckwerts to First Lord, 9 May 1938, ADM 116/3631, TNA; B.R. Mitchell and Phyllis Deane, *Abstract of British Historical Statistics* (Cambridge University Press, 1962), pp. 345, 478.

Table 3.2. *Defence departments' expenditure as percentage of GDP, 1919/20–1939/40*

Financial year	Total expenditure (£m.)	Percentage of GDP adjusted to financial year
1919/20	616.6	12.4
1920/1	232.4	4.6
1921/2	207.4	4.8
1922/3	138.1	3.6
1923/4	122.0	3.3
1924/5	114.7	3.0
1925/6	119.4	3.0
1926/7	116.7	3.0
1927/8	117.4	2.9
1928/9	113.5	2.8
1929/30	113.0	2.7
1930/1	110.5	2.7
1931/2	107.3	2.8
1932/3	103.0	2.8
1933/4	107.9	2.8
1934/5	113.9	2.8
1935/6	136.9	3.2
1936/7	186.1	4.1
1937/8	262.1	5.5
1938/9	382.5	7.7
1939/40	719.0	13.6

Sources: 1919/20 to 1923/4: John Ferris, *The Evolution of British Strategic Policy, 1919–26* (Basingstoke: Macmillan, 1989), p. 216; 1924/5 to 1938/9: *Statistical Account for the United Kingdom for Each of the Fifteen Years 1924 to 1938* (Cmd 6232), PP, 1939–40, x, 367; 1939/40: Robert P. Shay, *British Rearmament in the Thirties* (Princeton University Press, 1977), p. 297.

fall in GDP between 1929 and 1932. While John Ferris' description of the period 1921–7 as a peak in British military preparations in peacetime is something of an over-statement, he is correct in identifying retrenchment between 1928 and 1933 as the main cause of the deficiencies that policymakers had to attempt to remedy from 1934.⁸⁶

British power was bound to be affected by the changing fortunes of the national economy compared with other countries. In the severe depression of 1921 British GDP fell to 87.1 per cent of the 1913 level and the 1913 level was not achieved again until 1925. Economic growth

⁸⁶ John Robert Ferris, *The Evolution of British Strategic Policy, 1919–26* (Basingstoke: Macmillan, 1989), p. 180; John Robert Ferris, “‘It is our business in the Navy to command the seas’”, in G. Kennedy and K. Neilson (eds.), *Far-Flung Lines*.

lagged behind other industrial countries from 1913 to 1929, GDP having risen by only 11.9 per cent over that period compared with 63 per cent for the United States and 78.9 per cent for Japan (two countries whose economies had benefited from foreign orders during the war and rapid development during and after it). Even France and Germany achieved increases of 25.8 per cent and 21.6 per cent respectively, despite suffering at least as much economic disruption as Britain during and after the war. There are many reasons for the British economy's disappointing performance, including Churchill's decision, as chancellor of the exchequer, to return to the gold standard in 1925 at an over-valued exchange rate; slower growth in international trade than before 1914; and a reluctance or inability to change more quickly from an economy based on coal, cotton, iron and steel, shipbuilding and heavy engineering to one based on oil, man-made fibres, motor vehicles, light engineering and electrical goods. A world depression in the early 1930s saw British GDP fall by 5.1 per cent between 1929 and 1932, but this loss of output was mild compared with what other countries experienced: 28.0 per cent in the United States; 11.0 per cent in France and 15.8 per cent in Germany. Moreover, Britain recovered more quickly from the depression. Helped by suspension of the gold standard in 1931 and low interest rates from 1932, she reached her 1929 level of GDP by 1934, one year ahead of Germany and five years ahead of France and the United States.⁸⁷ However, Germany and Japan experienced very rapid economic growth in the 1930s and by 1937 the relative GDPs of the leading capitalist economies compared with 1913 were as shown in table 3.3: Britain had lost ground compared with all of them except France – the country with which she was most likely to be allied in war. Although reliable figures for Soviet GDP are not available, rapid industrialisation under Stalin meant that Russia was also relatively more powerful than in 1913.

Falling prices and economic depressions reduced the rate of return from taxes, yet chancellors of the exchequer faced a major increase in outgoings as a result of loans raised to pay for the war. The cost of servicing the national debt (interest, sinking funds and other charges) increased from £24.5 million, or 12.4 per cent of total revenue, in 1913/14 to an average of £344.5 million, or 37.4 per cent, in the 1920s. The 1913/14 figure had been about one-third of the combined army and

⁸⁷ Maddison, *Phases of Capitalist Development*, pp. 174–5. For a brief account of why Britain's experience differed from other countries, see Barry Eichengreen, 'The inter-war economy in a European mirror', in Roderick Floud and Donald McCloskey (eds.), *The Economic History of Britain since 1700*, 2nd edn, 3 vols. (Cambridge University Press, 1994), vol. II, pp. 291–317.

Table 3.3. *Indices of GDP for United Kingdom, France, Germany, Italy, Japan and the USA, 1913–37 (1913=100)*

	1921	1929	1932	1937
UK	87.1	111.9	106.2	130.9
France	80.5	125.8	112.0	120.8
Germany	87.5	121.1	102.0	153.4
Italy	98.0	130.4	125.5	146.1
Japan	146.9	178.9	173.2	261.2
USA	112.1	163.0	117.4	160.7

Sources: Angus Maddison, *Phases of Capitalist Development* (Oxford University Press, 1982), pp. 174–5.

navy estimates; the 1920s average was about three times the combined cost of the peace-time air force, army and navy.⁸⁸ Fortunately international interest rates fell in the depression of the early 1930s and the cost of servicing the debt was substantially reduced by converting 5 per cent War Loan to 3.5 per cent in 1932, saving £42 million a year. There was also a saving of £24.6 million from paying lower rates on Treasury bills. The decision in 1932 to make only a nominal repayment of the war debt to the United States, instead of the regular instalments agreed in 1923, saved a further £24.2 million.⁸⁹ Altogether these savings on the servicing of the national debt released a total of £90.8 million for other purposes, a not insignificant sum at a time when defence expenditure amounted to £103 million.

Unemployment relief was another major burden on the chancellor's budget. Unemployment rose in the depression of 1921 to 16.9 per cent of workers in occupations covered by the National Insurance Act of 1920; fell to about 10 per cent in the late 1920s; rose to about 22 per cent in 1931 and 1932, and then fell again to just under 11 per cent in 1937. Even so, the cost to the Exchequer was higher in the 1930s than the 1920s, as many workers had exhausted their right to unemployment insurance benefits and relied on Treasury-funded unemployment assistance. When Sir Richard Hopkins, the second secretary of the Treasury, was asked in November 1937 about future budget prospects, and therefore what could be afforded for defence within a balanced budget, he drew attention to the cost of unemployment assistance as a

⁸⁸ Calculated from figures in Bernard Mallet and C. O. George, *British Budgets, 3rd Series, 1921/22–1932/33* (London: Macmillan, 1933), pp. 554–7.

⁸⁹ Jeremy Wormell, *The Management of the National Debt of the United Kingdom, 1900–1932* (London: Routledge, 2000), pp. 622, 685.

major consideration, noting that in contrast to the figure of £20 million in 1929, it did not now fall below £55 million, owing to the numbers of long-term unemployed. It was capable of rising to £100 million.⁹⁰

The defence departments also had to compete with political pressure for extra Exchequer funds to help to deal with the housing problem that had worsened during the war (when few houses were built), as well as to pay for health services and education. Churchill, when arguing in 1924 for a reduction in the naval estimates, referred to the need to spend money on social reform. Failure to do so, he warned, would lead to a Socialist victory in the next election, and greater cuts in naval expenditure.⁹¹ There were also pressures to build roads and to provide other social infrastructure. Between 1932/3 and 1938/9 civil expenditure of all kinds that had to be paid for out of the chancellor's budget increased by £70 million, or 20 per cent.⁹²

The other pressure on the chancellor was to reduce taxation. The standard rate of income tax had increased from 1s 2d (5.8p) to 6s (30p) in the pound between 1913/14 and 1918/19, and the top rate of income tax plus surtax from 1s 8d (8.3p) to 10s 6d (52.5p). MPs, the press and business interests agitated continually from 1919 for reductions. Lloyd George responded by appointing the Geddes Committee in 1921 to make recommendations on how expenditure could be reduced, and most of the consequent cuts were at the expense of the defence departments rather than social services.⁹³

It is against this background that one can begin to understand the Ten Year Rule and Churchill's steps to strengthen it, first by having it renewed in 1925, and then by persuading the Cabinet in 1928 to extend it indefinitely, until such time as the Cabinet should decide to abrogate it on the advice of the Foreign Office or the Chiefs of Staff. In March 1932 the Cabinet took that decision, in the light of Japanese aggression in China, but the Chancellor, Neville Chamberlain, successfully resisted any immediate rise in the defence estimates. In a Treasury forecasting exercise in 1932 to see how the budget could be balanced in 1935 he provided for an increase in the defence estimates from £103 million to £115 million. In June 1934 he rejected a suggestion in a Cabinet committee that some of the expenditure recommended by the DRC

⁹⁰ Minutes of Inskip review, 25 Nov. 1937, T 161/855/S.48431/04, TNA.

⁹¹ Churchill to Baldwin, 15 Dec. 1924, in Gilbert, *Winston S. Churchill*, vol. V, companion, part 1, pp. 303–7.

⁹² Peden, *Treasury and British Public Policy*, p. 296.

⁹³ Dauntton, *Just Taxes*, esp. p. 47; Andrew McDonald, 'The Geddes Committee and the formulation of public expenditure policy, 1921–1922', *Historical Journal*, 32 (1989), 643–74.

should be financed by borrowing; at that date the risk to financial confidence, and therefore to recovery from the depression, seemed to be greater than the risks of slow rearmament.⁹⁴

However, on the initiative of the Permanent Secretary of the Treasury, Fisher, it was decided in 1935 that the rearmament programme being planned for the years 1936/7 to 1941/2 should be worked out on the basis that a defence loan would be available. This change of heart was brought about by intelligence reports about the scale of the German government's borrowing to pay for armaments. The Defence Loans Act of 1937 authorised borrowing over the period 1937/8 to 1941/2, the intention being to return to a balanced budget once the rearmament programme was complete. The absence of the need to balance expenditure and taxation annually enabled the defence departments to spend money more freely and to add to their programmes. The Treasury worried that the defence forces being created would be too big to maintain from taxation and tried to impose financial discipline by 'rationing' each department for the whole period down to spring 1942. Financial allocations could only be made after priorities had been reviewed on strategic grounds, and this task was given to Inskip, as minister for co-ordination of defence, advised by senior officials, the most regular participants at meetings being Hankey; Sir Arthur Robinson, chairman of the CID's Supply Board; Sir Horace Wilson, the chief industrial adviser; and Edward Bridges, the head of the Treasury division dealing with defence expenditure. In the summer of 1937 the defence departments estimated future annual maintenance costs at £255 million, on the basis of their approved programmes, and £301 million on the basis of the expanded programmes that they wanted. Treasury officials believed that £220 million might be found for defence from taxation from 1942/3, if there were no recession, and if there were no sinking fund with which to reduce the national debt, but the Cabinet was advised that it would be 'most unwise to assume' that more than £150 million to £170 million would be available on the 1937 basis of taxation. The lower figures were no doubt unduly pessimistic and were intended to concentrate the minds of ministers on the need to choose priorities or be prepared to raise taxes. In the event, although the Inskip review curbed the defence departments' tendency to add to their programmes in the second half of 1937 and the first nine months of 1938, further additions to the programmes, particularly between February and June 1939, raised the estimated future maintenance cost of the defence forces to £450 million, whereas 1939 tax rates (higher than in 1937)

⁹⁴ Peden, *British Rearmament*, pp. 7, 67, 69.

were expected to produce only £250 million for defence. By June 1939 the Treasury was contemplating a rise from the current standard rate of income tax of 5s 6d (27.5p) to a new, permanent, rate of 7s 6d (37.5p) in the pound, higher than the maximum rate of 6s (30p) reached in the First World War.⁹⁵

Treasury arguments against unlimited defence expenditure were not purely financial, although officials did believe that repeated borrowing would cause inflation, as it had done in the First World War. In 1937 they used the concept of economic stability as a fourth arm of defence. On this view, the real resources of the country were its manpower, productive capacity, trade, and ability to raise loans. Britain had to import raw materials and food, and nothing should be done to undermine industry's ability to export. The amount that the government could borrow depended upon two factors: the savings of the community and confidence in financial stability. If the government attempted to borrow more than the money market was willing to lend, the Bank of England would have to create credit and the result would be inflation. Higher domestic prices would have an adverse effect on exports, savings would be reduced, and financial confidence would be weakened. In order to be able to wage the long war that the Chiefs of Staff's plans envisaged, Britain would have to maintain its economic stability so that she would have greater staying power than Germany.⁹⁶ Chamberlain shared this line of thought, although his concerns were not purely economic or strategic. On 25 April 1937, shortly before becoming prime minister, he noted that expenditure on rearmament was causing prices to rise, and feared that in consequence there might be 'a series of crippling strikes ruining our programme, a sharp steepening of costs due to wage increases, leading to the loss of our export trade, a feverish and artificial boom followed by a disastrous slump, and finally the defeat of the Government'.⁹⁷

Economic stability was also necessary to maintain confidence in sterling. Sterling was used to finance international trade through London, and overseas sterling balances were held there to facilitate transactions. Sterling balances also formed all or part of the official reserves of countries forming the sterling area: the dominions, except Canada after 1931; India; British colonies, except Hong Kong; and

⁹⁵ Ibid., pp. 40–2, 73–4, 88–9, 102–3.

⁹⁶ 'Defence expenditure in future years: interim report by the Minister for Co-ordination of Defence', CP 316(37), 15 Dec. 1937, CAB 24/273, paras. 7–10. These paragraphs, which the Chancellor of the Exchequer, Sir John Simon, called 'a classic statement of the elements that make up our strength for national defence' (Cabinet conclusions, 16 Feb. 1938, CAB 23/92, TNA) are printed in Gibbs, *Grand Strategy*, vol. I, pp. 283–4.

⁹⁷ Feiling, *Neville Chamberlain*, p. 292.

some semi-independent countries, like Egypt; as well as of some foreign countries. During the Second World War overseas sterling balances held in London were to rise from a normal pre-war level of about £500 million to £3,355 million, the difference representing the value of goods and services obtained by Britain without payment other than a book entry at the Bank of England. The international acceptability of sterling was thus a valuable asset. However, foreigners would not hold more sterling than was required for current transactions if sterling was expected to depreciate against other currencies, as it tended to do in 1938–9 when Britain had an increasingly adverse balance of payments on current account. Moreover, when sterling depreciated, the cost of imports tended to rise, either directly as a result of goods priced in foreign currencies becoming more expensive, or because sterling prices abroad tended to rise. An increase in import prices was to be avoided because 25 to 30 per cent of the price of armaments produced in British factories represented the cost of imported raw materials. Foreign exchange to finance purchases outside the sterling area could be obtained only by exporting goods and services; by drawing on gold and foreign exchange reserves; by selling foreign securities owned by British subjects, or by borrowing. There was, however, no immediate prospect of loans from the American government, such as had sustained the British war effort in 1917–18. Britain, like almost all other countries, had ceased to make regular repayments of its war debt to the United States during the depression of the early 1930s, and in 1934 Congress included Britain in the provisions of the Johnson Act, which prohibited new loans to any government that was in default.⁹⁸

The Treasury's arguments have been challenged by Christopher Price, who claims that 'had the will to rearm existed, British resources were effectively limitless'. He believes that the system of imperial preference agreed at the Ottawa conference in 1932, whereby Britain and the dominions agreed to levy lower tariffs on trade between each other than on trade with foreign countries, had provided the means to escape the constraints of free-market conditions, but that instead Neville Chamberlain preferred to appease the United States by agreeing in November 1938 to a trade treaty that undermined the Ottawa agreements. Britain, Price believes, could have matched Nazi Germany, with its closed economy and intimidation of neighbours into joining its

⁹⁸ Ian M. Drummond, *The Floating Pound and the Sterling Area 1931–1939* (Cambridge University Press, 1981); G. C. Peden, 'A matter of timing: the economic background to British foreign policy, 1937–1939', *History*, 69 (1984), 15–28; L. S. Pressnell, *External Economic Policy since the War*, vol. I: *The Post-war Financial Settlement* (London: HMSO, 1986), pp. 1–2, 413.

autarkic system, because members of the sterling area 'were obliged to accept sterling in payment for their commodities'.⁹⁹ There are a number of problems with this thesis. The dominions were independent countries and they knew that the British market, large as it was, could not absorb all of their exports of raw materials and food. They did not, therefore, wish to cut themselves off from third markets by making the British Empire autarkic. Nor were the dominions obliged to adhere to the sterling area – Canada preferred to link its currency to that of its major trading partner, the United States. Other countries in the Empire, particularly India, the colonies, and areas of informal empire in the Middle East, had no choice but to accept sterling in payment for goods and services, but these countries, with the partial exception of India, were what would now be called 'underdeveloped', and their exports were limited to food and raw materials. It should also be noted that the sterling balances were not, as Price assumes, an 'unmitigated benefit' to Britain.¹⁰⁰ As will be discussed in chapters 5 and 6, the sterling balances represented claims on British exports. After the war they tended to make sterling vulnerable to speculative pressure, forcing successive governments to deflate by cutting public expenditure, including defence expenditure.

Returning to 1938, one cannot assume that Chamberlain's wish to win favour in the United States was a sign of antipathy towards the Ottawa agreements, of which he was one of the authors. Rather it almost certainly reflected awareness that the Empire could not provide all the goods that Britain would need in war, and that Britain would have to look to the United States for supplies, especially of industrial goods, as in the First World War. By 1938 Britain was already importing machine tools and other engineering products required for rearmament from outside the Empire, and experience in 1917–18 had shown that North American sources of supply for all goods, including food and raw materials, would be more economical in terms of shipping than more distant Empire sources. Given the Johnson Act, imports from North America would have to be paid for out of Britain's gold or dollar reserves, plus dollars earned from exports. Even cash purchases of munitions would be problematic, given American neutrality legislation in 1935 and 1937, which was designed to prohibit trade with, or credit to, a belligerent. There were good reasons why Britain should seek 'to conciliate and please' (to use Keynes' words in 1916) both the United States government and American public opinion in 1937–9.

⁹⁹ Christopher Price, *Britain, America and Rearmament in the 1930s: The Cost of Failure* (Basingstoke: Palgrave, 2001), esp. pp. xiii, 130–1.

¹⁰⁰ *Ibid.*, p. 185.

Price also believes that the depreciation of sterling and fall in the gold and convertible currency reserves that occurred in 1938–9 could have been halted at any moment by imposing exchange controls, instead of allowing half of Britain's war chest of gold and dollar reserves to be lost in eighteen months before the outbreak of war. The sterling:dollar exchange rate fell in 1938 from a high of \$5.02 in March to a low of \$4.60 in September, and the Bank of England and Treasury used the reserves to peg the rate at about \$4.67, until losses became too great in August 1939, when the rate fell to \$4.10. Britain's gold reserves fell from £836 million on 31 March 1938 to £470 million on 22 August 1939. Speculation against sterling over that period, Price argues, had nothing to do with the state of Britain's trade or economy. He demonstrates that exchange controls were being considered, reluctantly, by economists in the Cabinet Office as early as October 1937, and that opposition to adopting controls on the German model was led by the Treasury. He takes issue with the official historian of financial policy, R. S. Sayers, who commented that nothing could have been done to prevent foreigners withdrawing their money at the outbreak of war anyway.¹⁰¹

One problem with Price's argument is that, given free movement of sterling within the sterling area, exchange controls would have had to be introduced by all countries within it, not just by Britain. Such co-operation in the eighteen months before the war would not have been impossible, but it would have taken time to arrange. Even after controls had been introduced during the war, South Africa, the sterling area's major source of gold, was suspected of not co-operating fully. For controls to have been effective all international transactions would have had to be subject to government inspection, and postal censorship would have had to be imposed. The economic cost would not have been negligible; controls would have been an impediment to financing trade outside the sterling area and would have had an adverse effect on London's position as an international banking centre, reducing invisible exports in the form of income from financial services. At the end of July 1938 the Chancellor authorised the Bank of England to make preparations for exchange controls, but these were only to be imposed after the outbreak of war.¹⁰²

Speculation against sterling after March 1938 was mainly influenced by financial markets' reactions to political events. In December 1938

¹⁰¹ Ibid., pp. xiii–xiv, 85–6, 134–5, 150–1, 163–4; R. S. Sayers, *Financial Policy, 1939–1945* (London: HMSO, 1956), p. 229. For a balanced account, with data, see R. A. C. Parker, 'The pound sterling, the American Treasury and British preparations for war, 1938–1939', *English Historical Review*, 98 (1983), 261–79.

¹⁰² Sayers, *Financial Policy*, pp. 227–32, 314.

Table 3.4. *Balance of payments, 1930–8 (£ million at the end of calendar year)*

	(1) Visible balance ^a	(2) Invisible balance ^b	(3) Current account ^c	(4) Capital account ^d	(5) Change in reserves ^e
1930	–283	298	15	–8	7
1931	–322	208	–114	80 ^f	–34
1932	–216	154	–62	91	29
1933	–192	174	–18	140	122
1934	–220	188	–32	42	10
1935	–183	196	13	66	79
1936	–263	223	–40	251	211
1937	–336	279	–57	186	129
1938	–285	220	–65	–203	–268

Notes: ^a Export of goods minus imports of goods.

^b Net income from services and transfers of earnings.

^c Column 1 plus column 2.

^d All non-recurrent items, including new investment, payments on existing loans, net short-term liabilities, and transfers between banks.

^e Column 3 plus column 4.

^f Includes £80 million assistance from foreign banks.

Source: *Bank of England Quarterly Bulletin*, 14 (1974), 47–52, at 49.

Sir Frederick Phillips, the official in charge of the Treasury's finance divisions, believed that nine-tenths of the movement against sterling was due to distrust of it as a currency in the event of war.¹⁰³ However, Price goes too far in claiming that speculation against sterling had nothing to do with the state of Britain's trade or economy. The adverse balance of payments on current account in 1936 and 1937 (table 3.4) could be attributed mainly to strong economic recovery from the depression, but the existence of a growing balance of payments deficit at a time when Britain was borrowing to finance rearmament would have weakened confidence in financial markets. Of the currency outflow of £268 million in 1938 some £65 million, or about a quarter, was on current account and therefore not the result of speculation or the defence of sterling.

With the benefit of hindsight, one can see that exchange controls would have been worth imposing before September 1939, although at what point after 31 March 1938 this should have been apparent is hard to say. Sterling depreciation and exchange losses weakened Britain's capacity to wage a long war. Nevertheless, as we have seen, the growing sterling problem did not prevent a rise in defence expenditure from £262.1 million in 1937/8 to £382.5 million in 1938/9 or to an estimated

¹⁰³ Parker, 'Pound sterling', 269.

£750 million in 1939/40, or a growth in the planned scale of the armed forces from the programme as approved in mid-1937 (estimated to cost £255 million to maintain) to what had been approved by mid-1939 (£450 million).

The defence industries

The pace of rearmament from 1936 was determined chiefly by industrial capacity and by the government's policy of not interfering with normal civil trade. Lord Weir, the industrialist and former secretary of state for air who was consulted on the rearmament programme, advised ministers in January 1936 that it could not be carried out in five years, as recommended by the services, without affecting exports, unless semi-war controls similar to those used in Germany and Russia were imposed. Ministers did not dissent when he said that such controls would be politically impossible in Britain.¹⁰⁴ In September 1937 the Secretary of State for Air, Lord Swinton, warned that a continuation of the assumption that industry should not be interfered with would postpone the completion of the aircraft programme for two years, from 1939 to 1941. Nevertheless, it was not until 22 March 1938, after the Austrian *Anschluss* with Germany, that the Cabinet took the decision to cancel the assumption, and it was another twelve months before War Office orders enjoyed priority over normal trade.

With regard to the effects of the Ten Year Rule on the aircraft industry, the official historian of British war production, M. M. Postan, believed that government orders for aircraft prior to 1935 were insufficient to sustain an airframe and aero-engine industry capable of responding to the demands of rearmament for mass production of modern designs.¹⁰⁵ Peter Fearon has pointed to evidence that the Air Ministry's policy from the mid-1920s of allocating contracts so as to maintain a 'ring' of as many as eighteen firms in business prevented some firms gaining production experience.¹⁰⁶ However, David Edgerton and Sebastian Ritchie have shown that the British aircraft industry was

¹⁰⁴ Defence Policy and Requirements (Defence Requirements) Committee (DPR(DR)C) minutes, 13 Jan. 1936, CAB 16/123, TNA.

¹⁰⁵ M. M. Postan, *British War Production* (London: HMSO, 1952), p. 5.

¹⁰⁶ Peter Fearon, 'Formative years of the British aircraft industry', *Business History Review*, 43 (1969), 476–95; Peter Fearon, 'The British airframe industry and the state, 1918–35', *Economic History Review*, 27 (1974), 236–51; Peter Fearon, 'The vicissitudes of a British aircraft company: Handley Page Ltd between the wars', *Business History*, 20 (1978), 63–86; Peter Fearon, 'Aircraft manufacturing', in N.K. Buxton and D.H. Aldcroft (eds.), *British Industry between the Wars: Instability and Industrial Development, 1919–39* (London: Scolar Press, 1979), pp. 216–40.

Table 3.5. *Military aircraft production in Britain, France, Germany, Japan, the USA and the USSR, 1933–40*

	(1) Britain	(2) France	(3) Germany	(4) Japan	(5) USA	(6) USSR
1933	633	n/a	368	766	466	2,595
1934	652 ^a	n/a	1,968	688	437	2,595
1935	893 ^b	785	3,183	952	459	3,578
1936	1,830	890	5,112	1,181	1,141	3,578
1937	2,218	743	5,606	1,511	949	3,578
1938	2,827	1,382	5,235	3,201	1,800	7,500
1939	7,940	3,163	8,295	4,467	2,195	10,383
1940	15,049	n/a	10,247	4,768	12,804	10,565

Notes: ^a In addition 298 were exported.

^b In addition 453 were exported.

Sources: Col. 1: Sebastian Ritchie, *Industry and Air Power: The Expansion of British Aircraft Production, 1935–1941* (London: Frank Cass, 1997), pp. 9, 90; cols. 2–6: R.J. Overy, *The Air War 1939–1945* (London: Europa Publications, 1980), pp. 21, 150.

one of the strongest in the world and did not depend solely on domestic orders. Britain was the largest exporter of military aircraft from the late 1920s to the mid-1930s, with exports accounting for 26.9 per cent of all British production, including civil orders, in 1934 and 25.1 per cent in 1935. Moreover, there was a trend towards consolidation: Vickers purchased Supermarine in 1928; and by 1935 the Hawker Siddeley group included the Armstrong Whitworth, A.V. Roe, Gloster and Hawker airframe companies and the Armstrong Siddeley aero-engine company. Successful design teams, notably Fairey in the 1920s and Hawker in the 1930s, could make aircraft production a profitable business. Similarly, aero-engine production came to be dominated by Bristol and Rolls-Royce, who successfully specialised in the development of air-cooled radial and water-cooled in-line engines respectively. Prior to 1934 the British aircraft industry employed about twice as many workers as the German. Moreover, the German aircraft industry was not notably more concentrated than the British in the 1930s, with eleven firms of various sizes producing airframes (compared with fourteen in Britain) and five producing aero-engines (the same as in Britain).¹⁰⁷ British aircraft production fell behind that of Germany in the mid-1930s, but almost caught up in 1939 and was nearly 50 per cent higher than Germany's in 1940 (see table 3.5). The reasons for any shortcomings

¹⁰⁷ Edgerton, *England and the Aeroplane*, pp. 24–8; Edgerton, *Warfare State*, pp. 42–4; Sebastian Ritchie, *Industry and Air Power: The Expansion of British Aircraft Production, 1935–1941* (London: Frank Cass, 1997), pp. 9–19.

of the British aircraft industry are to be found in the years 1934 to 1938 rather than earlier. It was not until September 1936 that Swinton felt he could say that as important a firm as Vickers was 'at last fully alive to the necessity of straining every nerve to carry out their orders' under the rearmament programme.¹⁰⁸

One problem was that, despite increasingly generous contracts, it was difficult to persuade British firms to expand plant to the full extent required, given their experience of being left with surplus capacity after the First World War, when some firms, including one of the largest, Sopwith, had gone bankrupt, and given that a reduction in orders could be expected in 1942, when the rearmament programme was due to be completed.¹⁰⁹ A related problem was the need to prepare firms outside the aircraft industry to take part in the greatly increased production that would be required if war broke out. These problems were met by creating a 'shadow' industry for aircraft production. Plans for creating additional capacity for aircraft production had been drawn up in 1929 and were implemented from 1936. At first the shadow industry was intended to be made up of factories managed by automobile and other engineering firms, which would be given 'educational' orders in peacetime but whose main effort would be made in war-time. However, in 1938 the government decided to expand productive capacity by paying for the construction of factories that would be managed by established aircraft firms for an agency fee, and it was this expansion that made the greatest and most immediate contribution to productive capacity. There was also a rapid increase in sub-contracting from the spring of 1938, when the aircraft firms were told by the Air Ministry that they should aim to sub-contract at least 35 per cent of aircraft construction, whereas 10 per cent had been more normal earlier in the rearmament programme. As firms gained experience, labour productivity increased.¹¹⁰

Down to the spring of 1938 the Air Ministry had avoided placing orders for obsolescent aircraft merely to boost production figures. On 27 April 1938, however, the Cabinet, under parliamentary pressure to match German aircraft production, authorised the Air Ministry to accept as many aircraft as it could from the British aircraft industry, up to a maximum of 12,000 machines over the next two years. The Treasury readily sanctioned expenditure on plant required for the programme. As a result of these measures the gap between British and

¹⁰⁸ Secretary of State's progress meeting, 15 Sep. 1936, Air Ministry records, series 6, file 26 (AIR 6/26), TNA.

¹⁰⁹ Secretary of State's progress meeting, 17 Sep. 1935, AIR 6/23, TNA.

¹¹⁰ William Hornby, *Factories and Plant* (London: HMSO, 1958), pp. 218–26; Ritchie, *Industry and Air Power*, pp. 57–61, 91–105.

German production rapidly narrowed. The performance of Britain's aircraft industry compared very favourably with that of France, where nationalisation was associated with a fall in production in 1937, and where total production in the years 1936 to 1939 inclusive, 6,178, was only 41.7 per cent of the British total (see table 3.5).

The conventional picture of Britain's naval armaments industry is that it contracted considerably after the First World War and by 1935 was not capable of producing as many warships a year as it had done before 1914.¹¹¹ However, it still had the benefit of supplying the largest navy in the world. Britain may have had to concede parity to the United States Navy under the Washington and London naval treaties, but, as table 3.6 shows, Britain continued to order more warships than other naval powers both before and after rearmament began in earnest in 1936. Consequently, as Edgerton has shown, Britain had the world's leading naval-industrial complex. The industrial capacity involved extended far beyond the shipbuilding industry as conventionally defined: for example, 40 per cent of the price of a battleship represented the cost of guns, gun-mountings and armour plate. In the 1920s and early 1930s warship tonnage ordered averaged about half of the average for the decade 1900–10. Some firms did not prosper – notably Beardmore, which ceased to build warships (although it continued to produce armour and guns) after 1930. Others did much better. Vickers, half of whose turnover was in armaments, was the country's third largest manufacturing employer in 1935. From 1925 the Admiralty provided subsidies, direct or through the pricing of contracts, to ensure that specialised industrial capacity did not disappear: for example, for armour and shells. There was spare capacity waiting to be reactivated in 1935 and, while there were procurement bottlenecks in the supply of guns, gun-mountings, armour plate and electrical equipment, the Admiralty had to spend only a modest £12 million on new plant for private contractors, Admiralty factories and royal dockyards between April 1936 and April 1939, compared with commitments totalling £40 million made by the Air Ministry in the slightly longer period April 1936 to July 1939.¹¹²

By contrast, the War Office was very much constrained by lack of industrial capacity. Of the 250 national factories created by the Ministry of Munitions in the First World War, only three were retained through the inter-war period, and these were held in reserve and not rehabilitated until 1936–7. Munitions production down to 1936 was shared between the three historic royal ordnance factories at Woolwich,

¹¹¹ Gordon, *British Seapower* is the fullest exposition of this point of view.

¹¹² Edgerton, *Warfare State*, pp. 33–41; Hornby, *Factories and Plant*, pp. 202–3.

Table 3.6. *Major warships launched (or conversions to aircraft carriers begun), 1922–35 and 1936–40^a*

	Britain	France	Germany	Italy	Japan	USA
<i>1922–35</i>						
Capital ships	2	1	(3 = 1) ^b	0	0	0
Aircraft carriers	3 ^c	1	0	0	5	3 ^d
Cruisers	21 ^e	18	6	17	23	21
Destroyers	62	56	5	40	59	21
Submarines	34	77	12	54	53	13 ^f
<i>1936–40</i>						
Capital ships	5	3	4	4	2	2
Aircraft carriers	5	0	1 ^g	1 ^h	6	4
Cruisers	28	1	5	3	5	11
Destroyers	69	10	25	16	32	73
Submarines	39	6	140	62	27	33

Notes: ^a Excluding monitors and minelayers, and all surface ships of under 1,000 tons.

^b Armoured ships, popularly known as pocket battleships, each with a tonnage of about one-third of the maximum for a capital ship under the Washington Treaty.

^c Not including two wartime conversions or HMS *Hermes*, the world's first ship designed from the outset as a carrier, which was launched in 1919.

^d Excluding *Langley*, converted from a fleet collier in 1920–1.

^e A further five were built for the Royal Australian Navy.

^f 1924–35.

^g Launched 1938; construction suspended 1940.

^h Conversion of passenger liner begun in October 1940.

Source: Roger Chesneau (ed.), *Conway's All the World's Fighting Ships 1922–1946* (London: Conway Maritime Press, 1980).

Waltham and Enfield, and a much reduced private sector. There was adequate capacity for manufacturing small arms and ammunition for the army's rearmament programme of 1936, but not for guns, shells or tanks. Ten new royal ordnance factories were approved between 1936 and 1939, but this capacity was based on the size of army planned in 1936, not the army as it was expanded after March 1939. Reflecting the strategic priority given to air war, much of the new capacity for manufacturing guns was devoted to anti-aircraft requirements rather than those of the field army.¹¹³ The Air Ministry was allowed by the Treasury to pre-empt War Office requirements for machine tools in 1936 and, as part of the policy of non-interference with normal trade, the Treasury tried to have War Office orders postponed until they could be fulfilled by

¹¹³ Hornby, *Factories and Plant*, pp. 83, 89, 148–9; Postan, *British War Production*, pp. 7–8, 33.

the new royal ordnance factories, rather than being used to bring new firms into munitions production. The Morris car company and the London, Midland and Scottish Railway were asked to co-operate in the design and production of tanks, but in April 1939 Sir Harold Brown, the director-general of munitions production, reported to the CID that 'until recently' tank production had not been given a very high degree of priority as the work conflicted with locomotive and railway wagon work.¹¹⁴

Regarding the rearmament programme as a whole, Weir identified the supply of skilled labour as the most important bottleneck, and advised in January 1936 that steps should be taken to secure efficiency in its use.¹¹⁵ As in the First World War, changes in industrial practices – dilution – could overcome shortages of skilled labour, but trade unions were deeply suspicious that employers were trying to turn the situation to their own advantage, and feared that unemployment would follow the completion of the rearmament programme. The advice of the Ministry of Labour was that direct government contact with the trade unions should be avoided, as consultation would encourage the unions to demand a high price as regards conditions and wages in return for co-operation. The Ministry recommended using sub-contracting to take work to areas where there were still reserves of unemployed labour, and relying upon upgrading of individual skilled workers to better-paid positions supervising the work of semi-skilled and unskilled labour. The political atmosphere changed after the *Anschluss* and contacts between the government and trade union leaders began the same month (March 1938). Even so, it was not until 28 August 1939 that the Amalgamated Engineering Union and the Engineering Employers Federation at last signed an agreement on dilution. As R. A. C. Parker argued, there were real economic limits on rearmament.¹¹⁶

As in the First World War, private capital was attracted to armaments production by the prospect of profits, a sensitive matter for trade unionists and the wider political public. Neville Chamberlain tried to placate labour and voters in 1937 by introducing a new tax, national defence contribution (NDC), to be levied on any increase in profits. However, NDC as originally proposed would have hit firms that were recovering after being severely affected by the depression, and Chamberlain gave way to business protests and changed it to a straight

¹¹⁴ Peden, *British Rearmament*, pp. 169–71, 175.

¹¹⁵ DPR(DR)C minutes, 13 Jan. 1936 and DPR (DR) 8, memorandum by Weir, 27 Jan. 1936, CAB 16/123, TNA.

¹¹⁶ R. A. C. Parker, 'British rearmament 1936–9: Treasury, trade unions and skilled labour', *English Historical Review*, 96 (1981), 306–43.

5 per cent tax on all profits.¹¹⁷ Robert Shay has described profiteering as the final manifestation of the breakdown of co-operation between government and industry.¹¹⁸ However, he overstates the problem. The inter-service Contracts Co-ordinating Committee recommended a maximum profit of 15 per cent on capital employed in defence contracts, and the aircraft industry's average profits were 10 per cent in 1936 and 20 per cent in 1937. Under pressure of parliamentary criticism, the aircraft industry agreed to forgo a third of their forecast profits for 1939, to bring them down to 14 to 15 per cent. On the other hand, average profits on War Office contracts in 1937 and again in 1943 were estimated at about 10 per cent on capital employed. The highest profits appear to have been made on naval contracts: 27 per cent on cost between 1936 and 1939. Insofar as increasing profits reflected increasing efficiency – and this appears to have been the case at least in the aircraft industry – the nation benefited from having increased production from scarce resources.¹¹⁹

Shay believes that the government should have taken powers to oversee the management of industry to expedite the changeover of production from older to newer armaments, and to introduce the most productive organisational methods. He noted that Chamberlain was reluctant to incur the opposition of the Federation of British Industries, and preferred to ask for the resignation of ministers: Swinton from the Air Ministry in May 1938 and Inskip in January 1939, when they became convinced of the need for government controls.¹²⁰ Shay appears to see government as a potential *deus ex machina* for industrial problems, but civil servants lacked the necessary skills to operate controls without the wholehearted co-operation of businessmen. Departments like the Board of Trade and the Ministry of Supply delegated many of their responsibilities to business organisations both before and during the war.¹²¹

To argue thus is not to say that nothing could have been done. Clearly there were ways in which government controls could have transferred capital and labour to rearmament. For example, private funds could have been released to purchase government bonds, and the shortage of building labour could have been eased, if the government had taken action to curb the speculative house-building boom of the 1930s. The Ministry of Labour advised in the summer of 1936 that, as things stood,

¹¹⁷ Dauntton, *Just Taxes*, pp. 172–3.

¹¹⁸ Robert P. Shay, *British Rearmament in the Thirties: Politics and Profits* (Princeton University Press, 1977), p. 290.

¹¹⁹ G. C. Peden, 'Arms, government and businessmen, 1935–1945', in John Turner (ed.), *Businessmen and Politics: Studies of Business Activity in British Politics, 1900–1945* (London: Heinemann, 1984), pp. 130–45, at pp. 139–41.

¹²⁰ Shay, *British Rearmament*, pp. 291–2.

¹²¹ Peden, 'Arms, government and businessmen'.

the shortage of building labour could be expected to be serious for at least eighteen months (an accurate forecast: the boom broke at the end of 1937). Nevertheless, nothing was done, apart from administrative action to curb local authority building. It seems that ministers did not wish to offend middle-class voters. In July 1939, when war was still not certain, but the scale of rearmament was rapidly mounting, the Treasury recommended measures to control building society loans, bank advances, new issues on the stock exchange and company dividends, to ensure that the government could continue to borrow without inflation. The Treasury's conversion to controls that would normally be anathema to it reflected the extent to which it had lost control of the growth of defence expenditure and was having to find new ways in which to preserve the 'fourth arm' of economic stability.¹²²

By 1939 British armaments production matched that of Germany in important respects. Monthly aircraft production overtook that of Germany in September. More surprisingly, British monthly tank production was higher than German tank production in August 1939.¹²³ It is tempting to argue that if British rearmament had begun earlier – if Chamberlain had agreed to borrowing for defence in 1934 instead of 1935 – matters would have been very different in 1938 and 1939. Historians are not alone in exercising hindsight. Bridges, who had been the official in charge of the Treasury's division supervising defence expenditure before he succeeded Hankey as Cabinet Secretary in August 1938, remarked in December 1938 that there was nothing much wrong with the scale of Britain's preparations, but 'I wish we had started rearming a year earlier'.¹²⁴ Sir Roger Backhouse, newly appointed first sea lord in November 1938, took the view that it had been a great misfortune that rearmament had not started two years earlier; 'even one year would have made a great difference'.¹²⁵ That was true of building warships that were not limited by treaty, of reconstruction of capital ships, and of stores, such as reserves of oil for the main fleet's movement to Singapore. However, as noted in previous sections, not all modern armaments were available for production earlier than 1938–9, the most important examples being monoplane fighters and tanks larger than light tanks. The question of what armaments were to be produced was also determined in part by strategy, and it is to strategy, and its interactions with economic considerations, that we now turn.

¹²² Peden, *British Rearmament*, pp. 83–4, 100–3.

¹²³ Postan, *British War Production*, pp. 56, 107, 109–10, 471, 484.

¹²⁴ *Chief of Staff: The Diaries of Lieutenant-General Sir Henry Pownall*, ed. Brian Bond, 2 vols. (London: Leo Cooper, 1972–74), vol. I: 1933–1940, p. 175.

¹²⁵ Backhouse to Vice-Admiral G. H. D'O Lyon, 21 Nov. 1938, ADM 205/2, TNA.

Grand strategy

Victory in the First World War left Britain, for a time, without any obvious enemy against whom to prepare. The Air Staff cultivated politicians' fears about air warfare, but until after Hitler came to power the only air force within striking distance of Britain was the French *Armée de l'Air*. In CID discussions on 'the continental air menace' in 1922 Lloyd George did mention the possibility that French air superiority might weaken British diplomacy, but France was unlikely to allow relations with Britain to deteriorate to a point that would allow Germany to denounce the Treaty of Versailles. The primary reason given for creating what became known as the Home Defence Force in the United Kingdom was to allow a strategic bombing force to be organised.¹²⁶ A force of fifty-two squadrons, including fighters, reconnaissance and army co-operation machines as well as bombers, was approved in 1923, but once Anglo-French relations improved in 1925 there was no urgency in completing it until it became known in 1934 that Germany was secretly creating an air force. As for the British army, its plans were laid on the basis of slow mobilisation to provide reinforcements for India against the Soviet Union, until the DRC identified Germany as Britain's likely long-term enemy in 1934.

Naval strategy was based on protecting Britain's world-wide interests. The Admiralty's aim in disarmament negotiations was to ensure that the navy would have enough ships to protect British trade and the Empire's communications and territories, where these were exposed to seaborne attack. Barnett and Paul Kennedy lament the loss of British naval supremacy at Washington in 1921.¹²⁷ However, the upper limits agreed at Washington on total tonnage of capital ships and aircraft carriers, as well as on the maximum size and armament of capital ships, aircraft carriers and cruisers, enabled the Admiralty to achieve its aim at a cost that Britain could afford. The Admiralty resisted American efforts to extend the 5:5:3 ratio to cruisers, since it claimed that British cruiser strength was determined by what was required to protect Britain's world-wide trade and communications. In 1921 the Admiralty said fifty cruisers would be necessary; in 1927, at the Geneva conference, it claimed seventy (contributing thereby to the failure of the conference); in 1930, at the first London naval conference, it settled for fifty, on the

¹²⁶ CID minutes, 5 July 1922, CAB 2/3; 'Report of the Sub-Committee on Continental Air Menace', 26 Apr. 1922, CAB 3/3, TNA. See also John Ferris, 'The theory of a "French air menace": Anglo-French relations and the British Home Defence Air Force programmes of 1921-25', *Journal of Strategic Studies*, 10 (1987), no. 1, 62-83.

¹²⁷ Barnett, *Collapse of British Power*, pp. 270-2; Paul Kennedy, *The Rise and Fall of British Naval Mastery* (London: Allen Lane, 1976), pp. 276-7.

grounds that it was unlikely to have more, given the large block of cruisers built during the war that would be due to be scrapped in the mid-1930s. The difference between the British and the Americans was essentially technical: the British wanted adequate cruisers of 7,500 tons, armed with 6-inch guns and costing £1,400,000, for trade protection and enforcing blockade; the Americans, with less trade to protect but with vast oceans to operate in, preferred 10,000-ton cruisers, with 8-inch guns and costing £2,200,000. The difference was resolved in 1930 by giving the British a higher tonnage, but fewer 10,000-ton cruisers, than the Americans. A ratio of 10:10:7 was agreed for Britain, the United States and Japan in cruisers and destroyers, provided the Japanese, like the British, limited their number of larger cruisers. The American navy was seen by the Admiralty as a yardstick, not as a potential enemy.¹²⁸

The Admiralty's plans for a war with Japan evolved from 1919 to 1939 but all assumed that each navy would attempt to interrupt the other country's trade, and that Japan would be vulnerable to a distant blockade, given her need to import food and raw materials, including oil. A British fleet based at Singapore could defend British interests, and Admiralty planners doubted whether the Japanese would risk their fleet in what would be a long-range operation to attack the base there. Indeed, until 1937 naval strategy aimed at using economic pressure or operations against Japanese colonies to *force* the Japanese to accept battle. Hong Kong was seen as a valuable forward base that should be defended if possible, although not at the expense of the main base at Singapore.¹²⁹ The building of capital ships by Germany and Italy in the late 1930s drastically changed the number of capital ships that could be spared for the Far East. Down to 1939 it had been assumed that from Britain's fifteen capital ships a force could be sent to the Far East roughly equal to Japan's nine (ten once the *Hiei*, which had been reduced after Washington to a training ship, had been reconverted to a combat ship). In May 1939, however, Admiralty policy was altered to sending only seven capital ships, and then only if Italy were neutral or had been eliminated. Otherwise only four would go if the United States

¹²⁸ O'Brien, *British and American Naval Power*, pp. 164–8, 173, 183, 193, 198, 210–13.

¹²⁹ The key documents are the 'Eastern war memorandum' prepared by the Admiralty's Plans division in 1920 (ADM 116/3124) with subsequent revisions in 1923 (ADM 116/3124), 1924 (ADM 116/3125), 1931 (ADM 116/3118), 1933 (ADM 116/3475) and 1937, with amendments to June 1939 (ADM 116/4393), TNA. For evolution of Far Eastern strategy, see Christopher Bell, *The Royal Navy, Seapower and Strategy between the Wars* (Basingstoke: Macmillan, 2000), pp. 49–98, and Andrew Field, *Royal Navy Strategy in the Far East 1919–1939: Planning for War against Japan* (London: Frank Cass, 2004).

were neutral, and only two if the United States were an ally.¹³⁰ The following month, Chatfield, now minister for co-ordination of defence, challenged this policy, and a new assessment by the Chiefs of Staff stated that seven capital ships could be sent to the Far East, once two ships refitting in dock became available in August and September, if the Mediterranean were to be abandoned. Allowing for the fact that two other capital ships would still be refitting, only six would be available in home waters against the Germans' two battle-cruisers and three pocket battleships.¹³¹ The dilemma with which strategists would be presented in the Second World War had thus been set out beforehand.

The army and air force were involved in planning for a Far Eastern war only insofar as they were required to assist in the protection of the Singapore naval base, especially while the main fleet was sailing from European waters, a period assumed in 1921 to be 42 days. However, in 1937 the period before relief was estimated to be 70 days, and in July 1939 it was extended by the CID to 90 days. Moreover, whereas the Air Staff had been keen between 1921 and 1934 to press the merits of air power for the defence of Singapore, the air defence of the United Kingdom took priority thereafter, and the number of RAF aircraft stationed in Malaya was always smaller than the number that could be carried aboard the Japanese navy's aircraft carriers. The nature of the problems of protecting Singapore was thus altering dramatically in the 1930s owing to external factors. The same was true of local factors. The seaward defences of Singapore depended upon 15-inch coastal guns, capable of sinking a capital ship, but the vulnerability of the landward approach changed over the inter-war period owing to the development of the Malayan economy. In 1921–4 the first military studies of the possibility of Japanese troops landing in Johore to attack Singapore from the landward side had suggested that the combination of dense jungle and poor roads would make their movements difficult. However, the replacement of jungle by rubber plantations, through which troops could move easily, had altered the situation by the 1930s. Moreover, as a result of exercises in 1936–7, it became apparent that the Japanese might land in the north of Malaya, to establish air bases, before the main British fleet could arrive. The scales of the army and air forces required to defend Malaya were thus

¹³⁰ 'Naval policy in the event of Far Eastern war', minute by Director of Plans, Captain V. H. Danckwerts, 5 May 1939, enclosing revised memorandum, ADM 116/3863, TNA.

¹³¹ 'The situation in the Far East', COS 931, 24 June 1939, CAB 53/50, TNA.

increasing even as developments in Europe made adequate reinforcement from Britain less likely.¹³²

The most likely alternative sources of reinforcements for the Far East in war-time were India and Australia. Down to the mid-1930s the Indian army had been mainly concerned with internal security and with possible Soviet threats to the North-West Frontier. However, from 1934 the War Office and the Indian army began to think in terms of earmarking some Indian units for service outside the sub-continent. The Indian army's 'Plan M' of 1935 envisaged sending one brigade to Singapore in sixteen to eighteen days, provided the situation in India itself was favourable. In the same year the crisis with Italy over its invasion of Abyssinia led to an Indian brigade being earmarked for use in Egypt if necessary. By 1938 India had accepted liabilities to provide a total of four infantry brigades and two infantry battalions for emergencies in other parts of the Empire. Yet, as a CID sub-committee reviewing Indian defence that year pointed out, the British Government could have no certainty that India would be able to fulfil any of these commitments. India had achieved a degree of home rule that enabled Indian politicians to oppose tax increases to pay for its armed forces, and the modernisation of the Indian army that followed the CID report and a further report by Chatfield in 1939 was made possible only by British subsidies and a reorganisation of the Indian army that reduced its size. India's role as a source of reinforcement for both the Far East and the Middle East was signalled by decisions in July 1939 to send one brigade each to Singapore and Egypt prior to the outbreak of war.¹³³

The independence of the dominions in regard to imperial defence had been demonstrated in the Chanak crisis in 1922, when all except New Zealand withheld unconditional support to Britain against Turkish nationalist troops threatening British occupation forces at the Dardanelles. From that time the co-operation of the dominions could not be taken for granted. As the Chiefs of Staff pointed out in 1930, the dominions agreed that each part of the Empire was responsible for its own local defence, but assumed that the United Kingdom would shoulder most of the responsibility for defence of the Empire as a whole. The Chiefs of Staff and the Treasury were at one in regarding as absurd the need to make plans to send reinforcements from Britain to Singapore, as these could be sent far more quickly from Australia.¹³⁴ In

¹³² For the building of the Singapore naval base and for plans for its defence, see Neidpath, *Singapore Naval Base*, esp. pp. 91–101, 125, 133, 153–62, 166–7.

¹³³ John Rawson, 'The role of India in Imperial defence beyond Indian frontiers and home waters, 1919–39', D. Phil. (Oxford, 1976), esp. pp. 199, 216, 250, 281, 316–17, 324–5, 352.

¹³⁴ Chiefs of Staff to Prime Minister, 29 Oct. 1930 (copy in Chancellor of the Exchequer's Office), T 172/1700, TNA.

Table 3.7. *Commonwealth navies in 1931 and 1939 (1931 figures in brackets)*

	Capital ships	Aircraft carriers	Cruisers	Destroyers
United Kingdom	15 (15)	7 (6)	56 (46)	174 (156)
Australia	—	—	6 (4)	5 (6)
New Zealand	—	—	2 (2)	—
Canada	—	—	—	7 (4)

Sources: *Jane's Fighting Ships* (1931 and 1939).

1934 Hankey undertook an Empire tour with a view to educating dominion governments in the light of the DRC report, but found that economic depression and tight budgets made it almost impossible for them to find more money for defence.¹³⁵ It was calculated that in 1937/8 Britain spent five to six times as much per head of population on the armed forces as the white populations of the dominions did. Even Australia, the country most concerned with the Japanese danger, spent only 1 per cent of its national income on defence in that year.¹³⁶

Although the Empire depended upon seaborne communication the dominions' naval contributions were modest at best (table 3.7). Between 1931 and 1939 the Australian navy took delivery of three cruisers, transferring its sole, obsolescent, seaplane carrier to the Royal Navy in part exchange, and the New Zealand navy replaced two old cruisers with two new ones. The Canadian navy had no ships bigger than destroyers. The largest ship in the South African navy was an 800-ton surveying vessel. At the Imperial Conference in 1937 the First Lord of the Admiralty, Sir Samuel Hoare, recommended that the dominions should consider carefully whether they were in a position to build and maintain capital ships. The Admiralty calculated that, taking maintenance into account, the overall cost of a capital ship only slightly exceeded the cost of two large cruisers. However, although the Dominions Secretary, Malcolm MacDonald, suggested in 1938 that Australia might be asked to pay for a capital ship, in the same way as it had done for the battle-cruiser *HMS Australia* before 1914, no dominion did so.¹³⁷ From an Australian or New Zealand point of view, the question was: could the Royal Navy guarantee their coasts from

¹³⁵ Roskill, *Hankey*, vol. III, pp. 121–40.

¹³⁶ Peden, 'Burden of imperial defence', *Historical Journal*, 27 (1984), p. 416.

¹³⁷ Extract from minutes of meeting of principal delegates at the Imperial Conference, 26 May 1937, reprinted in S. R. Ashton and S. E. Stockwell (eds.), *British Documents on the End of Empire*: series A, vol. I: *Imperial Policy and Colonial Practice*, part 1: *Metropolitan Reorganisation, Defence and International Relations, Political Change and Constitutional Reform* (London: HMSO, 1996), pp. 116–19; Cabinet conclusions, 23 Feb. 1938, CAB 23/92, TNA.

attack? If not, these countries might do better to build up their ability to meet such attacks with air and ground forces. In fact, persuaded by the Admiralty, both Australia and New Zealand spent more on their navies than on their armies and air forces.¹³⁸

None of the dominion armies was trained or equipped to fight the troops of a first-class power at the outbreak of war. As late as April 1939 the incoming Labour government in Australia refused to implement its predecessor's decision to create a small regular force of two independent brigades, and in New Zealand the army estimates were cut in 1937/8 to find room in the budget for more money for the navy and air force. Australia could mobilise enough men from its militia for two cavalry and four infantry divisions, three independent brigades and two recently formed armoured car regiments, and New Zealand could mobilise one division, but all of these units required further training before they could be committed to a campaign. Canadian defence policy gave first priority to the direct defence of Canada. Plans existed for the mobilisation of two infantry divisions at the outbreak of war but it was not until June 1940 that one of these was ready to be sent to France. Prior to the war, South Africa's small army was equipped only for colonial warfare in Africa.¹³⁹ British strategists, therefore, had to regard dominion forces as potential extra assets which were not to be taken into account in plans for what would happen at the outbreak of war.

As table 3.8 shows, the pattern of defence expenditure down to 1935 reflected the predominance of the navy as the protector of British trade and the Empire's communications, with the army coming second as the provider of imperial garrisons, and the air force a poor third. The recommendations of the official Defence Requirements Sub-Committee (DRC) on 28 February 1934, as drafted by Hankey, reflected and reinforced this pattern. Although the report identified Germany as the ultimate potential enemy, most of the deficiencies listed were in existing programmes, and the most urgent recommendations were defensive measures against Japan. As table 3.9 shows, the actual pattern of expenditure from 1935 was quite different from that recommended by the official DRC. The air force moved from having the smallest share of expenditure to the largest share, overtaking the army in 1937/8 and the

¹³⁸ John McCarthy, *Australia and Imperial Defence 1918–39: A Study in Air and Sea Power* (St Lucia, Queensland: University of Queensland Press, 1976); W. David McIntyre, *New Zealand Prepares for War* (University of Canterbury Press, 1988).

¹³⁹ F. W. Perry, *The Commonwealth Armies: Manpower and Organisation in the Two World Wars* (Manchester University Press, 1988), pp. 137–9, 160–4, 191–2.

Table 3.8. *Expenditure by the defence departments, 1924/5–1939/40*

	(£'000)		
	Air Force	Army	Navy
1924/5	14,310	44,765	55,625
1925/6	15,470	44,250	59,657
1926/7	15,530	43,600	57,600
1927/8	15,150	44,150	58,140
1928/9	16,050	40,500	56,920
1929/30	16,750	40,500	55,750
1930/1	17,800	40,150	52,574
1931/2	17,700	38,520	51,060
1932/3	17,100	35,880	50,010
1933/4	16,780	37,592	53,500
1934/5	17,630	39,660	56,580
1935/6	27,496	44,647	64,806
1936/7	50,134	54,846	81,092
1937/8	82,290	77,877	101,950
1938/9	133,800	121,361	127,295
1939/40	294,834	242,438	181,771

Sources: *Statistical Abstract for the United Kingdom for Each of the Fifteen Years 1924 to 1938* (Cmd 6232), PP 1939–40, x, 367; (for 1939/40 only) Shay, *British Rearmament*, p. 297.

navy in 1938/9. These changes reflected a shift in priorities brought about by fear of air attack, the theoretical danger mooted by Baldwin in 1932 having become a matter of urgency.

During the DRC's discussions in January and February 1934, Fisher and Vansittart had unsuccessfully urged the CAS, Ellington, to ask for more than he did. The DRC report recommended ten additional squadrons to complete the Home Defence scheme of fifty-two squadrons of 1923; ten additional squadrons of aeroplanes and four of flying boats for service in the Far East; and twenty additional squadrons for the Fleet Air Arm (FAA). The report stated that a further twenty-five squadrons would be necessary to meet 'all eventual requirements', but it did not consider these to be part of the 'worst deficiencies' to be remedied by 1939, although they should be reconsidered if Germany expanded her air force rapidly.¹⁴⁰ When the report was considered by ministers, Neville Chamberlain produced an alternative proposal for thirty-eight additional squadrons instead of ten for the Home Defence

¹⁴⁰ DRC minutes, 30 Jan., 16 Feb. and 26 Feb. 1934, and DRC report, paras. 28–9, 28 Feb. 1934, CAB 16/109, TNA.

Table 3.9. *Distribution of expenditure by the defence services, 1933/4–1938/9*

Financial year	(per cent)		
	Air Force	Army	Navy
<i>Defence Requirements Sub-committee Report, 1934</i>			
1934/5	14.9	37.7	47.5
1935/6	15.0	36.0	48.9
1936/7	15.8	35.1	49.1
1937/8	16.3	34.8	48.9
1938/9	16.1	34.6	49.3
<i>Actual expenditure</i>			
1933/4	15.6	34.8	49.6
1934/5	15.5	34.9	49.7
1935/6	20.0	32.6	47.3
1936/7	26.9	29.5	43.6
1937/8	31.4	29.7	38.9
1938/9	35.0	31.7	33.3

Note: Because of rounding up or down, the figures do not always sum to 100 per cent.

Sources: First DRC Report, 28 Feb. 1934, CAB 16/109, TNA; *Statistical Abstract for the United Kingdom* (Cmd 6232), PP 1939–40, x, 367.

Force, but only three additional squadrons instead of ten for the Far East, and with FAA requirements to be met by making Home and FAA squadrons interchangeable. The source of these ideas was almost certainly Trenchard, who was advising the Permanent Secretary of the Treasury, Fisher, at the time. A Cabinet sub-committee on the allocation of air forces in July 1934 agreed with the Admiralty that FAA squadrons had to be kept separate, but otherwise accepted Chamberlain's view that the RAF should be concentrated in the United Kingdom, recommending thirty-three additional squadrons for the Home Defence Force, four for the Far East, and four-and-a-half for the FAA.¹⁴¹

Chamberlain had intended to find the extra money for air force expansion by cuts or delays in the army and navy programmes. In particular, he thought that, while the naval base at Singapore must be completed, it should be used for the time being only for submarines and other light craft, and that plans for sending a fleet of capital ships there must be postponed. Again he almost certainly got these ideas from Trenchard via Fisher. As noted above, the Admiralty did not accept this reduction in priority for the Far East until 1939. When the rearmament programme was

¹⁴¹ DCM (32) 120, 20 June 1934, CAB 27/511; CP 193 (34), 16 July 1934, CAB 27/514, TNA. Andrew Boyle, *Trenchard, Man of Vision* (London: Collins, 1962), pp. 681–2.

drafted in the winter of 1935–6 the Admiralty recommended a two-power standard, to match both Germany and Japan, without saying how many capital ships this would require. In the event, although the two-power standard was never formally sanctioned by the Cabinet, the Admiralty proceeded to place orders for major warships as if it had. Industrial capacity, not finance, was the limiting factor.¹⁴²

The War Office did not fare so well at Chamberlain's hands in 1934. The Chancellor secured a cut in the army's DRC programme from £40 million to £20 million, with the result that the army's deficiencies would take more than five years to repair.¹⁴³ Again Trenchard's influence can be seen in Treasury thinking. He advised Fisher that anti-aircraft guns and searchlights south of the Wash and an expeditionary force for securing continental air bases should rank alongside the Home Defence air force and Singapore's defences as first priorities among the deficiencies to be made up. Chamberlain asked in a Cabinet committee in May whether an expeditionary force could reach the Low Countries in time to prevent them being overrun, and he seems to have been impressed by the argument that possession of Belgian bases would place the RAF as close to the Ruhr as German bombers would otherwise have been to London. At any rate in June he said that, while priority should be given to the RAF to deter Germany from going to war at all, the United Kingdom could best be made secure by expanding the Home Defence Force and anti-aircraft defences first, and then by equipping the army to co-operate with allies in holding the Low Countries. He justified the cut in the army's DRC programme by saying that he did not believe that Germany would be ready for war in 1939.¹⁴⁴

When the army's rearmament programme came to be considered by ministers in January 1936, Weir advised that the army was the most expensive way of helping allies. Professional soldiers cost more than conscripts; the Territorial Army hardly existed, except on paper; the Germans, starting from scratch, had got ahead on field artillery. The army also took longer than the air force or navy to reach the scene of action. Like Chamberlain, he wondered whether Germany could be deterred by a powerful air force, in which case the army's Field Force (as the expeditionary force was then known) would not be needed. Chamberlain noted that, of the three armed forces, the army would make the largest demands on industry, and that an 'offensive', rather than 'defensive', air force might be a more effective means of assisting

¹⁴² Peden, *British Rearmament*, pp. 114–16, 162–5.

¹⁴³ Bond, *British Military Policy*, pp. 199–208.

¹⁴⁴ Peden, *British Rearmament*, pp. 121–3.

the French if the Germans attempted to encircle their fortifications in the first week of the war, before the Field Force could be disembarked.¹⁴⁵ Given what Weir had said about the impossibility of carrying out the whole rearmament programme on time without semi-war controls over industry, Chamberlain argued, some part of the rearmament programme must be left out. He persuaded his Cabinet colleagues that equipment for the Territorial Army's twelve divisions should be omitted, apart from what was required for training. Nevertheless, the Regular Army's programme for equipment for four infantry divisions, a mobile division and a tank brigade, with war reserves, was to be completed, if possible, within five years.¹⁴⁶

By October 1937 Chamberlain had read Liddell Hart's *Europe in Arms* and had recommended the book to Leslie Hore-Belisha, the secretary of state for war, who was in any case in frequent communication with the author. Liddell Hart's thesis that British strategy in 1914–18 had been a mistaken departure from a traditional British way of warfare based on 'limited liability' to European allies thus entered Whitehall at the highest level.¹⁴⁷ However, the Inskip review, which led to a change in the role of the army in December 1937, was based on a report by the Chiefs of Staff Sub-Committee on Planning for a War with Germany in February 1937. The report stated that economic pressure by naval blockade would be a powerful, if slow, means of weakening Germany, and Inskip drew the conclusion that she should be confronted with the risk of a long war in which sea power would be decisive. Britain's economic stability would deter Germany, as would ability to repel an attempted knock-out blow from the air.¹⁴⁸ The key figures who advised him when he recommended that the Field Force should be prepared to meet the military needs of the Empire, but not equipped on a scale necessary to support allies in Europe, were Chatfield and Hankey. Chatfield was chairman of the Chiefs of Staff Committee, as well as first sea lord, but he did not operate through that committee when he advised Inskip on this occasion. On 10 November Chatfield accepted the Treasury's argument that ever-growing defence programmes would lead to national

¹⁴⁵ Memorandum by Lord Weir, 9 Jan. 1936, and DPR(DR)C minutes, 14 Jan. 1936, CAB 16/123, TNA.

¹⁴⁶ DPR(DR)C minutes, 13 Jan., 14 Jan., 16 Jan. and 27 Jan. 1936, CAB 16/123, TNA; Chamberlain's diary, NC 2/23A, 19 Jan. 1936, Birmingham University Library.

¹⁴⁷ Basil Liddell Hart, *Europe in Arms* (London: Faber and Faber, 1937); Alex Danchev, *Alchemist of War: The Life of Basil Liddell Hart* (London: Weidenfeld and Nicolson, 1998), pp. 187–94; Gat, *History of Military Thought*, pp. 725–7; R.J. Minney, *The Private Papers of Hore-Belisha* (London: Collins, 1960), p. 54.

¹⁴⁸ 'Planning for war with Germany', DP (P) 2, 15 Feb. 1937, CAB 16/182, para. 115; 'Defence expenditure in future years', CP 316 (37), CAB 24/273, paras. 9–13, TNA.

bankruptcy, and he believed that Britain could not afford an army on the scale that the War Office wanted as well as the navy and air force essential for the security of the United Kingdom and the Empire. On 12 November a report by the Chiefs of Staff predicted that the German army would be unlikely to be strong enough to attack the French and Belgian frontier defences before 1939–40. Hankey, who did much of the drafting of Inskip's report, had always placed a high priority on the navy and on imperial defence, and on 23 November he advised that the army should no longer be prepared for service on the continent of Europe. While the Treasury's 'fourth arm of defence' argument led Inskip and others to accept a need to impose financial limits on rearmament, the consequent strategic priorities were determined outside the Treasury.¹⁴⁹

Inskip's interim report of 15 December 1937 stated that the cornerstone of defence strategy must be the security of the United Kingdom, where the Empire's principal strengths in manpower and industrial capacity lay. It was for this reason that he recommended that the first and main effort should be directed to protection of the United Kingdom against attack, and to preserving its trade routes. The defence of Britain's overseas territories and interests was less important than these two objectives, since so long as the United Kingdom was secure 'we may hope in time to repair any losses or defeats suffered elsewhere'. Inskip was unhappy about the recommendation that the objective of co-operation in the defence of the territories of allies in war should be provided for only after the first three had been met. His report noted that, despite recent developments in air warfare and in mechanised forces on land, there was no evidence that infantry would not be required in a future war. He therefore warned his colleagues that they should expect to be criticised if it proved later to be necessary to improvise an army to assist France if she were in danger of being overrun. Nevertheless, the Cabinet accepted his recommendation that the War Office's estimates should be prepared on the assumption that the army's primary roles were to be anti-aircraft defence of the United Kingdom and imperial defence.¹⁵⁰

Inskip's second report of 8 February 1938, in fixing the defence departments' financial 'rations' for the next four years, mentioned that the army was to be equipped for 'an Eastern theatre', claiming that this

¹⁴⁹ 'Report by Chiefs of Staff Sub-Committee of the CID on comparison of the strength of Great Britain with that of certain other nations as at January 1938', *Documents on British Foreign Policy 1919–1939 (DBFP)*, 2nd series, vol. XIX (London: HMSO, 1982), p. 502; Peden, *British Rearmament*, pp. 137–8.

¹⁵⁰ 'Defence expenditure in future years', CP 316 (37), CAB 24/273, esp. paras. 41–4, 61, 72–5, 101, TNA.

role would make possible substantial reductions in the provision of tanks and reserves of ammunition compared with what would be required for European operations.¹⁵¹ The War Office took Egypt to be the most probable eastern theatre. There had been a danger of war with Italy in 1935–6, and since the summer of 1937 the Chiefs of Staff had been engaged in a major strategic appreciation on the Mediterranean and the Middle East. The likelihood that control of the eastern Mediterranean would be temporarily lost if Britain were engaged in war simultaneously with Germany, Japan and Italy was accepted, but the Chiefs of Staff agreed that the defence of Egypt was necessary both strategically, on account of the Suez Canal, and to maintain Britain's prestige in the Middle East. It was envisaged that an armoured division and two infantry divisions, with perhaps a third in reserve, would have to be sent out from the United Kingdom within a month of the outbreak of hostilities, and the Chiefs of Staff recommended that the garrison in Egypt should be brought up to strength and should include a mobile force capable of providing cover in the Western Desert until reinforcements arrived.¹⁵² At the suggestion of the Chancellor of the Exchequer, now Sir John Simon, the Cabinet decided that the Field Force should be prepared 'for general purposes' rather than a particular campaign. This decision enabled the Treasury to hold up War Office proposals that would exceed what was required for a Field Force of one armoured division and two infantry divisions, plus two infantry divisions to be ready in forty days, plus a further two infantry divisions, which might be Regular or Territorial, to be ready four months after the outbreak of war. Further divisions, from the Territorial Army, would not be able to take the field until after the eighth or tenth month of the war.¹⁵³ In March 1938 the army was able to put into the field only two infantry divisions, both deficient in many kinds of equipment required for modern warfare, including artillery.¹⁵⁴ Inskip's recommendation for the army was ambitious in relation to what actually existed, and it allowed for further re-equipment of the army with the available industrial capacity. Apart from the new medium tank, which was only a paper project in 1937, the development of the armoured vehicles designed for European warfare was continued. Howard commented that Inskip had

¹⁵¹ 'Defence expenditure in future years: further report by the Minister for Co-ordination of Defence', CP 24 (38), 8 Feb. 1938, CAB 24/274, para. 15, TNA.

¹⁵² Steven Morewood, *The British Defence of Egypt 1935–1940: Conflict and Crisis in the Eastern Mediterranean* (Abingdon, Oxon.: Frank Cass, 2005).

¹⁵³ Peden, *British Rearmament*, pp. 143–4. ¹⁵⁴ *Ironside Diaries*, pp. 53–4.

replaced a policy of limited liability in continental warfare with one of no liability at all,¹⁵⁵ but the new strategy was not irreversible.

The change in the European balance of power following the loss of the Czech army of thirty-five divisions after the Munich agreement made it impossible to ignore French pressure for support on land in a future war. The Chiefs of Staff recommended that the Field Force of four infantry divisions, plus two armoured divisions each with six tank battalions instead of the existing 'mobile' division of nine battalions, should be equipped for a campaign on the European continent; that four Territorial divisions should also be fully equipped so as to be ready to be sent overseas as soon as their training was complete; and that a further eight Territorial divisions should have enough equipment to enable them to be trained for overseas service. When the role of the army was discussed in Cabinet on 2 February 1939 Simon expressed his fear that the scale of proposed increases from all three armed services would undermine Britain's financial strength, but the Foreign Secretary, Lord Halifax, argued successfully that the present state of tension with Germany must end soon in war or the destruction of the Nazi regime. When the War Office's proposals came before the Cabinet again on 22 February Chamberlain said that he had come reluctantly to the conclusion that there was no alternative to preparing the army for European operations. The dates by which the first echelons, each of two infantry divisions, of the Field Force were to be ready to embark were to be settled in staff talks with the French, but the first of the two armoured divisions would not be ready until mid-1940. Following the German occupation of the rump of Czechoslovakia on 15 March 1939, volunteers flocked to the Territorial Army, and as an alternative to conscription its establishment was doubled from thirteen to twenty-six divisions on 29 March. (Conscription followed anyway in April, partly to provide for permanent manning of Britain's anti-aircraft defences and partly to impress foreign opinion.) The enlarged Territorial Army made it possible to promise increased support for France and by mid-April the continental commitment comprised four Regular infantry divisions to be despatched within six weeks; the first ten Territorial divisions to be available in the fourth, fifth and sixth months; and the last sixteen Territorial divisions to be ready in the ninth to twelfth months.¹⁵⁶ On the other hand, the rapid increase in the number of divisions disrupted the organisation of the Regular and Territorial armies only a few months

¹⁵⁵ Howard, *Continental Commitment*, p. 117.

¹⁵⁶ Cabinet conclusions, 2 Feb. and 22 Feb. 1939, CAB 23/97, TNA; Gibbs, *Grand Strategy*, vol. I, pp. 503–18; *Pownall Diaries*, vol. I, pp. 196–7.

before the outbreak of war, and it was unlikely that the new Territorial formations could be equipped and trained within twelve months.¹⁵⁷

Howard argued that the defence of the Empire led to the dissipation of British strength. However, Britain's land and air forces round the Empire tended to be the last to receive up-to-date equipment.¹⁵⁸ It was the defence of the United Kingdom that took up industrial capacity for anti-aircraft guns and their reserves of ammunition – capacity that might otherwise have been used for the Field Force's artillery. Likewise, Inskip recommended that there should be expansion of the RAF in the United Kingdom but he rejected proposed increases in overseas squadrons, although he recognised that his recommendation meant permanent and dangerous insecurity against Japan and Italy.¹⁵⁹

Although Inskip was persuaded that the greatest danger to be faced was an air attack on the United Kingdom that might inflict a knock-out blow at the outset of a war, he did not give the RAF all that it wanted. He advised that the Air Staff should no longer aim at having an air striking force equal to the German air striking force. The Air Staff held that the deterrent effect of an air force was greatly increased if the enemy knew that he would sustain the same damage as he could inflict, but Inskip did not believe that the government's public commitment to air parity should lead it to try to match the German air force as regards numbers or types. The full increase asked for by the Air Staff for fighter squadrons should, he thought, be granted. However, according to the Air Ministry's calculations, the aircraft industry had not yet built up enough capacity for production in war-time to replace the losses that the Air Staff estimated would be sustained by the size of air force that the expansion scheme adopted in 1936 aimed to create. The Air Staff had used these estimates to justify reserves of aircraft equal to 225 per cent of first-line strength. Inskip argued that it would be better to use some of the industrial resources that would have gone into producing reserves of aircraft to expand the aircraft industry's productive capacity, including shadow factories. He also said that while there should be 'some increase' in the present first-line bomber strength, fighters must have priority. Despite the priority he had allocated to defence of trade routes, Inskip did not refer to the Air Staff's proposal to provide only fifty-six aircraft for trade defence, although that figure was remarkably modest in relation to the proposals for bombers (an increase from 1,022 to 1,442) or the approved increase in fighters (from 420 to 532).¹⁶⁰ This lack of

¹⁵⁷ David French, *Raising Churchill's Army: The British Army and the War against Germany 1919–1945* (Oxford University Press, 2000), p. 157.

¹⁵⁸ Howard, *Continental Commitment*, p. 100; Peden, 'Burden of imperial defence'.

¹⁵⁹ 'Defence expenditure in future years', CP 316 (37), CAB 24/273, paras. 98–9, TNA.

¹⁶⁰ *Ibid.*, paras. 80–99.

provision can be attributed to the Air Staff's priority for strategic bombing and the Admiralty's wish to avoid further conflict with the Air Ministry so soon after recovering control of the FAA, but Inskip himself cannot escape criticism.¹⁶¹

The Cabinet endorsed Inskip's recommendations, but Sir John Slessor, who was head of the Air Staff's Plans Branch from 1937 to 1940, admitted in his memoirs that fighters were not really given priority by the Air Ministry until the autumn of 1938.¹⁶² Indeed, the Secretary of State for Air, Swinton, told the Cabinet that, while it could say whether an expansion scheme was affordable, it could not dictate to the Air Staff what the character of the air force should be. Scheme L, which the Cabinet approved on 27 April 1938, provided for 608 fighters, an increase of 76 on the proposed numbers in December 1937, and 1,352 bombers, a reduction of 90. Scheme M, which the Air Ministry put forward after Munich, provided for 800 fighters and 1,360 bombers, but 10 of the 50 fighter squadrons were allocated to work with the Field Force, and all of the bombers were to be heavy types, whereas 600 of Scheme L's bombers had been medium types. The Treasury protested that Scheme M, if implemented in full, would make such heavy demands on industry that it would 'probably bring down the general economy of this country'. Chamberlain, who in late 1938 was still in favour of maintaining the fourth arm of defence, and the Secretary of State for Air, now Sir Kingsley Wood, accepted the Treasury view that if Scheme M were revised to concentrate more on fighters and go slowly on bombers, the strain on the economy would be reduced. One heavy bomber cost the equivalent of four fighters. On 7 November 1938 the Cabinet duly approved Scheme M's proposals for fighters, specifying maximum production possible before April 1940, but directed that only sufficient orders for bombers were to be placed to ensure that labour and plant were not unemployed. However, Cabinet decisions do not necessarily determine what happens in the execution of policy: technical difficulties in producing new fighters and the fact that much plant was already committed to producing bombers meant that fighter deliveries did not overtake those of bombers until February 1940. Moreover, the Treasury could not prevent the Air Ministry from creating the industrial capacity required to produce a new generation of heavy bombers. In the event technical delays in

¹⁶¹ For the services' attitudes, see John Buckley, 'Contradictions in British defence policy 1937-1939: the RAF and the defence of trade', *Twentieth Century British History*, 5 (1994), 100-13.

¹⁶² Slessor, *Central Blue*, pp. 166, 180.

bringing in new types into production, not the Treasury-inspired Cabinet decision, were what held back the re-equipment of Bomber Command.¹⁶³

The RAF's offensive strategy was confronted with other practical difficulties in 1938 and 1939. Air Staff doctrine since Trenchard's time had held that an air force could act decisively to destroy the enemy's morale and means of production. However, the rapid expansion of Bomber Command after 1936 had denied it the opportunity to train aircrew adequately for the tasks they were expected to perform. Even in favourable daylight conditions the average aircrew was unlikely to drop bombs closer than 250 yards to its target, and experience of the Spanish Civil War suggested that the 250- to 500-pound general purpose bombs with which the RAF was equipped would do little damage to reinforced concrete. Most of the aircraft available were too short-range to penetrate deep into Germany, even from French bases, and had inadequate defensive armament. The officer in charge of Bomber Command, Air Chief Marshal Sir Edgar Ludlow-Hewitt, warned the Air Council in May 1939 that his force would not be ready for war 'within any predictable period'.¹⁶⁴ In the circumstances, the Air Staff's offensive doctrine was hollow, and it was as well that Fighter Command had been given sufficient priority to give the United Kingdom effective protection against defeat by air attack.

The Air Staff's strategic doctrine had led to a considerable misallocation of resources in the production of bombers inadequate for their purpose. Moreover, the Air Staff had aroused unnecessary fears among ministers of a knock-out blow that the German air force was in no position to deliver in September 1938 or even in the Second World War. The *Luftwaffe* also experienced problems in carrying out rapid expansion, and chose medium bombers in the 1930s instead of heavy bombers, as they made fewer demands on scarce resources and had the flexibility to co-operate with the army as well as attack civil targets. However, the choice also reflected the inadequacies of the four-engined types available to the Germans at the time. The *Luftwaffe* believed in strategic bombing, and had ordered the development of a new four-engined type, the Heinkel He 177, which the German air ministry expected to be in production in late 1940 or early 1941.¹⁶⁵ Given that

¹⁶³ Cabinet conclusions 6 Apr. and 27 Apr. 1938, CAB 23/93, and 7 Nov. 1938, CAB 23/96, TNA; Peden, *British Rearmament*, pp. 133–4, 158–60; Postan, *British War Production*, p. 484; Smith, *British Air Strategy*, pp. 217–20, 264–6, 334–5.

¹⁶⁴ Smith, *British Air Strategy*, pp. 241–3, 268–81.

¹⁶⁵ Williamson Murray, *The Change in the European Balance of Power: The Path to Ruin* (Princeton University Press, 1984), pp. 39–45, 250–2; R. J. Overy, 'From "Uralbomber"

Britain's rearmament programme was designed to cover a period down to April 1942, it was not unreasonable for Air Staff offensive and defensive strategy to take account of the potential threat of German heavy bombers.

What is perhaps most notable about British strategic foreign policy in 1939 is the confidence with which Chamberlain confronted Germany. In the diplomatic sphere, he announced on 31 March that Britain would support Poland in the event of an armed attack, and similar guarantees to Romania, Greece and Turkey followed in April. However, he was doubtful about the wisdom of an alliance with the Soviet Union. He distrusted Stalin's intentions, as did the Polish and Romanian governments. Moreover, British intelligence reports suggested that the Soviet armed forces would not be able to provide much assistance.¹⁶⁶ Negotiations in Moscow failed to reach agreement on the crucial question of whether the Red Army should have the right of passage over Polish territory, and the Germans took the opportunity to sign a non-aggression pact with the Soviet Union on 23 August, leaving Britain and France isolated.¹⁶⁷

Summary

By May 1939 the navy doubted its ability to fulfil plans, dating from 1920, to send out a fleet to the Far East adequate to meet the Japanese fleet, and Bomber Command doubted its ability to carry out the strategic air offensive that Air Staff doctrine laid down for it. From February 1939 the army was being belatedly prepared for a continental commitment that it had been told throughout the previous twelve months not to prepare for. How had defence policy gone so far astray when Britain had seemed to be so secure in the 1920s? One obvious reason was the difficulty of adapting strategy to a changing international situation. The DRC report of February 1934 was rapidly overtaken by events: Germany rearmed at a pace that Britain found difficult to match, and Italy appeared as an additional potential enemy. The dominions were not prepared to share Britain's overall responsibility for the defence of the Empire and Commonwealth, and political developments limited India's contribution. Chatfield and Hankey both put imperial defence

to "Amerikabomber": the Luftwaffe and strategic bombing', *Journal of Strategic Studies*, 1 (1978), no. 2, 154–78.

¹⁶⁶ See reports, dated 6 Mar. 1939, from Moscow Embassy in *DBFP*, 3rd series, vol. IV, pp. 188–99.

¹⁶⁷ The best account of these events is Donald Cameron Watt, *How War Came: The Immediate Origins of the Second World War, 1938–1939* (London: Heinemann, 1989).

before a continental commitment for the army, but Inskip, while allocating a non-European role for the army, deliberately subordinated the air requirements of imperial defence to the air defence of the United Kingdom.

The Treasury exercised strong influence as long as ministers were more concerned with economic risks than military ones. The Treasury's doctrine of economic stability as a fourth arm of defence, which would help to deter Germany and prepare for the long-war strategy being planned by the Chiefs of Staff, reflected experience of the economic effects of the First World War, just as the Chiefs' strategy reflected the perceived success of the blockade in weakening Germany by 1918. The fact that Britain would be unable to borrow again from the United States in the foreseeable future made it seem important that Britain should be able to finance purchases in America from her own resources. The policy of non-interference with normal trade was designed to protect export markets and therefore Britain's ability to earn foreign exchange. From March 1938 that policy was gradually abandoned and rearmament accelerated, raising the question of whether an earlier effort would not have greatly improved the position in which Britain found itself in 1938 and 1939. However, while the British armaments industries were not backward by international standards in the early and mid 1930s, there was a danger in the case of the air force and army that an earlier effort might have produced more obsolescent equipment, exemplified by the story of the Battle bomber or by the army's problems with tank designs, rather than war-winning weapons. This argument does not apply to the navy, whose ships were less prone to obsolescence than aircraft or tanks, but it was in the air and on land that Britain was weakest.

Acceptance of the doctrine of the fourth arm of defence led the Cabinet, on Inskip's recommendation, to make a choice between having an air force or an army ready for war with Germany in 1939. Fear of the bomber, which the Air Staff had carefully cultivated since the 1920s, pointed to a higher priority for the air force. The danger of the *Luftwaffe* being able to deliver a knock-out blow by an attack on the United Kingdom was much exaggerated in the 1930s. Far from being conservative, policymakers were too readily impressed by new weapons. On the other hand, it could not have been known in advance that the Germans would fail to develop strategic bombers, and Britain's air defences – the most advanced in the world – were by no means over-insurance. It was realised that the United Kingdom would be more exposed to air attack if the Low Countries were occupied by Germany,

but Inskip, in giving priority to air defence and to the defence of trade routes, assumed that France was not in immediate danger of being overrun. He recognised the possibility that the army would have to be prepared to help France at a later date. The doctrine of the fourth arm of defence was accepted in 1937–8 when the purpose of rearmament was long-term deterrence rather than war. By February 1939 the situation had changed and, in the last months of peace, military strategy was determining economic policy rather than the other way round.

4 The Second World War

Introduction

The German invasion of Poland on 1 September 1939 led to British and French declarations of war two days later, but Britain's war aim was to end the Nazi menace, not to preserve the status quo in Eastern Europe. This aim endured through a succession of military disasters and the extension of the war to the Mediterranean and the Far East through the intervention of Italy on 10 June 1940 and of Japan on 7 December 1941. From the French armistice with Germany on 22 June 1940 to Hitler's invasion of the Soviet Union exactly a year later the British Commonwealth and Empire fought alone. Hopes of victory depended upon supplies of food, raw materials and munitions from the United States, and therefore on victory over the U-boats as well as on American aid through the Lend-Lease Act of March 1941. Although the Japanese attack on Pearl Harbor brought the United States fully into the war, it was not until the American naval victory at Midway in June 1942 that the Japanese were decisively checked. The summer of 1942 was the nadir of British fortunes: Singapore had surrendered on 15 February; India was threatened. The Commonwealth armies in North Africa were heavily defeated by the Germans and Italians, and it seemed that Egypt too might be lost. The tide turned in late 1942, with the battle of El Alamein (23 October – 5 November), the Anglo-American landings in North Africa (8 November) and the Soviet relief of Stalingrad (19–25 November). Thereafter the Allies were on the offensive.

It is tempting for the economic historian to attribute the Allies' victory to their combined technological, industrial and manpower resources. This position has been put forward most convincingly by Mark Harrison, who has argued that, while purely military factors more than offset the Allied economic advantage down to 1942, thereafter 'economics determined the outcome' in a war of attrition.¹ However, as

¹ Mark Harrison (ed.), *The Economics of World War II* (Cambridge University Press, 1998), p. 2. Paul Kennedy takes a similar position: *Rise and Fall*, p. 458.

Richard Overy has argued, victory was not pre-ordained in 1942. The Axis powers occupied most of continental Europe and much of the Far East. Unity of purpose on the part of the Allies could not be assumed. The Allies' early defeats pointed to the need to improve the qualitative performance of their armed forces as well as of their equipment. Mobilisation of national economies depended upon a will to win on the part of the people. Only after Germany had surrendered on 8 May 1945 did a decisive weapon appear in the shape of the atomic bomb.²

The scholarship embodied in the British official civil and military histories of the Second World War has endured the test of time and the opening of the archives. However, the division between civil and military series makes it harder to see the war as a single process, especially as weapons design and production, and blockade and economic warfare, were covered in the civil series.³ This chapter discusses whether Britain was able to produce weapons of the same standard as the Germans'; whether her economic resources were fully utilised; and whether grand strategy made the most of her advantages. For the purposes of analysis, the war can be divided into three phases: first, the period of the Anglo-French alliance, ending in June 1940; second, the period when Britain and, from 1941, the Soviet Union and the United States were largely on the defensive, down to the autumn of 1942; and third, the period thereafter when the Allied powers were able to go over to the offensive.

Polycymakers

Although Chamberlain had taken a leading part in shaping defence policy since 1934, he was not cut out to be a war leader. Aged 70 in 1939, he died of cancer in November 1940, six months after his resignation as prime minister. He brought back Churchill into government as first lord of the Admiralty at the outbreak of war, and gradually confidence and goodwill developed between the two men. From 4 April 1940 Churchill chaired meetings of the Military Co-ordination Committee when the Prime Minister did not attend. The Military Co-ordination Committee brought together the Chiefs of Staff and ministers, and its reports were discussed by the Defence Committee of the War Cabinet, which met almost daily, and conclusions or disagreements were referred to frequent meetings of the War Cabinet. Churchill understandably felt that the prolonged process of explanation and re-explanation was inappropriate

² Richard Overy, *Why the Allies Won* (London: Jonathan Cape, 1995).

³ *History of the Second World War, UK Civil Series*, ed. W. K. Hancock and *UK Military Series*, ed. J. R. M. Butler (London: HMSO, 1949–76).

when the pace of events increased after the invasion of Norway on 9 April, and was able to secure more authority for himself on 1 May even before he became head of the coalition government nine days later.⁴

Churchill brought zeal and enthusiasm to the task of winning the war and was undaunted in the face of defeat. He added the title of minister of defence to that of prime minister, but there was no ministry of defence. Instead interdepartmental sub-committees reported to the Chiefs of Staff Committee and the Defence Committee of the War Cabinet. He dealt directly with the Chiefs of Staff, summoning them to conferences at all hours. He created the Defence Office under Major-General Hastings Ismay, whom Chamberlain had placed in charge of the central staff servicing the Chiefs of Staff Committee, and who acted as Churchill's personal representative on that committee.⁵ The Chiefs of Staff might also be in attendance at the War Cabinet or its Defence Committee, but meetings of the latter became rare as Churchill preferred staff conferences, where few or no other ministers were present. The service ministers were left to run their departments while he and the Chiefs of Staff ran the war. Churchill tended to think in terms of battles, of which he had personal experience, rather than strategy, which requires a steady, disciplined outlook on the overall situation. He frequently badgered the Chiefs of Staff to produce plans for erratic strategies of his own devising and was reluctant to accept the limitations imposed by what was logistically possible. His commitment to victory at any cost assumed that the United States would pick up the bill and he was reluctant to accept that Britain's manpower could not sustain the size of army and air force that he wished to create.⁶ His speeches inspired the nation, but he could be deceived by his own rhetoric. No one in authority but he referred to the Singapore naval base as a 'fortress', and he was surprised when it did not withstand a long siege. He was constantly attracted to the potential of new weapons. He needed strong men to stand up to him and fortunately the Chiefs of Staff generally came into that category. Sir Alan Brooke (CIGS, 1941–6), Sir Andrew Cunningham (first sea lord, 1943–6) and Sir Charles Portal (CAS, 1940–6) were not men who could be easily diverted from agreed

⁴ Winston S. Churchill, *The Second World War*, 6 vols. (London: Cassell, 1949–54), vol. I: *The Gathering Storm*, pp. 406, 528–30, 576–8.

⁵ *The Memoirs of General the Lord Ismay* (London: Heinemann, 1960), ch. 6.

⁶ See *War Diaries 1939–1945: Field Marshal Lord Alanbrooke*, ed., Alex Danchev and Daniel Todman (London: Weidenfeld and Nicolson, 2001), pp. 187, 189–91, 261, 263, 279, 321, 323–5, 410, 427–8, 430, 515, for Churchill's obsession with invading Norway, despite lack of air cover and shipping, his reluctance to reduce the size of the army, and his opportunism as opposed to long-term strategy.

strategy by the flow of minutes from the Prime Minister. On the other hand, Sir John Dill, an able CIGS in 1940–1, found Churchill's confrontational style almost unbearable. Sir Dudley Pound, the first sea lord from 1939 to 1943, who also acted as chairman of the Chiefs of Staff Committee, suffered from poor health and his colleagues thought that he was too tolerant of Churchill's interference in detail. His successor as chairman, Brooke, admired Churchill's achievements but felt in August 1944 that the Prime Minister, by then in his seventieth year, ought to retire.⁷

The way in which the war economy was organised changed dramatically under Churchill. While Chamberlain was prime minister the Treasury had been the central department of government. The Chancellor of the Exchequer, Simon, chaired the War Cabinet's Ministerial Committee on Economic Policy, which co-ordinated the work of a range of ministerial and official committees. Chamberlain refused to appoint a minister for war economy, on the grounds that his own authority and that of the Treasury would be undermined thereby. He worked closely with the Permanent Secretary of the Treasury, Sir Horace Wilson, who had been his confidential adviser since 1937 and who was associated by many, including Churchill, with the policy of appeasement. In contrast, Churchill's War Cabinet did not include the new Chancellor of the Exchequer, Sir Kingsley Wood, until 3 October 1940 and Wilson was banished permanently from 10 Downing Street.⁸ Churchill, like Lloyd George in the First World War, rejected financial prudence. The allocation of physical resources, especially labour, replaced financial budgeting as the means of allocating priorities. Co-ordination of economic and social policy now became the responsibility of the Lord President's Committee, initially chaired by Chamberlain but from 3 October 1940 by Sir John Anderson. Anderson was ideal for the job, having a formidable intellect and vast experience as a public servant in the Home Civil Service and in India. He was backed by a staff of professional economists, the Central Economic Information Service, which was divided into the Economic Section of the War Cabinet Office and the Central Statistical Office in December 1940. Economists had skills that enabled them to offer advice that was independent of the Treasury and other Whitehall departments. Churchill's

⁷ Michael Carver, 'Churchill and the defence chiefs', in Blake and Louis (eds.), *Churchill*, pp. 353–74; Alanbrooke, *War Diaries 1939–1945*, pp. 450–1, 580–1.

⁸ 'Economic co-ordination', 7 Dec. 1939, T 175/117, TNA; Peden, *Treasury and British Public Policy*, pp. 250, 301–2, 306–8.

Prime Minister's Statistical Section, although chaired by a scientist, Professor F. A. Lindemann, also included economists.⁹

The other major change in the War Cabinet on 3 October 1940 was the inclusion of Ernest Bevin, a leading trade unionist, who had been appointed minister for labour and national service on 13 May. Bevin and Churchill had been on opposite sides during the General Strike of 1926, and workers accepted controls from Bevin that his Conservative predecessor, Ernest Brown, had not dared to impose. Admittedly circumstances had altered: the danger of invasion in the summer and autumn of 1940 made exceptional measures politically possible. However, a willingness to accept the transferability of labour between industries and occupations was crucial to manpower planning long after fear of the invasion had vanished.¹⁰

Churchill was alone among ministers in devising strategy, but the War Cabinet included men of sound judgement who could criticise his ideas. The Labour Party leader, Clement Attlee, was the most important. He was, after all, Major Attlee, who had served at Gallipoli, in Mesopotamia and on the Western Front, being twice wounded. He was successively lord privy seal, dominions secretary and, from September 1943, lord president of the council, in succession to Anderson, who had become chancellor of the exchequer.¹¹ Sir Stafford Cripps, when lord privy seal in 1942, engaged in a critique of Churchill's highly personal direction of the war, before leaving the War Cabinet to serve as an able minister of aircraft production. Policy-making in war-time was much more of a team effort than Churchill's popular image, carefully cultivated in his memoirs, as the man who won the war, would suggest.¹² The nation needed an inspirational leader and Whitehall badly needed prodding in 1940, but Churchill needed antitheses to his theses to ensure that there would not be another Gallipoli.

⁹ John Wheeler-Bennett, *John Anderson, Viscount Waverley* (London and New York: Macmillan, 1962), pp. 258–71, 275, 315–16; Alec Cairncross and Nita Watts, *The Economic Section 1939–1961: A Study in Economic Advising* (London: Routledge, 1989), pp. 28–69; D.N. Chester, 'The central machinery for economic policy', in D.N. Chester (ed.), *Lessons of the British War Economy* (Cambridge University Press, 1951), pp. 5–33; Thomas Wilson, *Churchill and the Prof* (London: Cassell, 1995).

¹⁰ Alan Bullock, *The Life and Times of Ernest Bevin*, 2 vols. (London: Heinemann, 1960–67), vol. II: *Minister of Labour 1940–1945*; W.K. Hancock and M.M. Gowing, *British War Economy* (London: HMSO, 1949), pp. 148–50, 301–3, 452–5.

¹¹ Kenneth Harris, *Attlee* (London: Weidenfeld and Nicolson, 1982).

¹² David Reynolds, *In Command of History: Churchill Fighting and Writing the Second World War* (London: Allen Lane, 2004).

Air weapons and tactics

Controversy over the strategic air offensive against Germany in the Second World War shows no sign of abating. In particular, the destruction of Dresden in February 1945 aroused condemnation that has persisted for over half a century. Sir Arthur Harris, the air officer commanding-in-chief, Bomber Command, from February 1942 until the end of the war, saw the main target of his force as the morale of the enemy civil population, and in particular of the industrial workers. The targeting of civilians through Bomber Command's tactic of area bombing has since been criticised on tactical, strategic and moral grounds.¹³ The pros and cons of area bombing have to be considered in relation to the technology available, as well as to the strategic alternatives.

As noted in the [last chapter](#), Bomber Command had expanded so rapidly that it was not ready for war in 1939, either in terms of having enough trained crews or of having aircraft that could have made a reality of its doctrine of strategic bombing. The larger bombers, the Hampden, Wellington and Whitley, could reach any part of Germany except the extreme east, but only the Hampden and the Wellington were designed for day as well as night bombing, the slower Whitley being considered fit only for night operations. The loss of twelve of twenty-two Wellingtons to German fighters during a reconnaissance of the Heligoland Bight in December 1939 was an early warning that even the best-armed British bomber was vulnerable by day. Accurate bombing by night was to prove to be an elusive skill. The Butt Report of August 1941 used photo-reconnaissance material to show that only one-third of aircraft reported to have attacked their targets had been within five miles of them, many of the bombs falling in open countryside. Clearly there was a great waste of effort involved. A policy of widespread bombing of civilian areas was

¹³ Sir Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany 1939–1945*, 4 vols. (London: HMSO, 1961) was the most controversial of all the British official histories of the Second World War. It drew upon the Report of the British Bombing Survey, which was drafted by Solly Zuckerman and approved by the post-war CAS, Sir Arthur Tedder, both of whom had pressed for bombing of transport systems rather than area bombing during the war – see Sebastian Cox's introduction to the published edition of the Report, *The Strategic Air War Against Germany 1939–1945* (London: Frank Cass, 1998). Malcolm Smith, 'The Allied air offensive', in John Gooch (ed.), *Decisive Campaigns of the Second World War* (London: Frank Cass, 1990), pp. 67–83, is a useful short summary of the main issues from the point of view of the implications of new technology. Denis Richards, *The Hardest Victory: RAF Bomber Command in the Second World War* (London: Hodder and Stoughton, 1994), like Webster and Frankland, challenged the effectiveness of area bombing, but denied that the aim was to kill civilians. The debate on Dresden is placed in the context of Allied bombing policy in Paul Addison and Jeremy Crang (eds.), *Firestorm: The Bombing of Dresden, 1945* (London: Pimlico, 2006).

adopted from the autumn of 1941, with a view to breaking German morale. However, as better radar aids and bombsights became available, and after a specialist Pathfinder Force was formed to guide the mass of bombers, accuracy improved. By early 1944 area bombing was no longer a technical necessity, and it had always been the Air Staff's intention to return to precision bombing of targets selected on strategic grounds as soon as the tactical capabilities of the bomber force allowed. Harris, however, preferred to continue with area bombing.¹⁴ The official historians raised the question of why the CAS, Portal, did not impose the Air Staff's views or replace Harris, and concluded that Harris was too popular with his command and with the Prime Minister for Portal to do either.¹⁵

It was not until 1943 that Bomber Command had large numbers of the kind of aircraft required for a strategic air offensive. The Mark V Whitley, which had just entered production at the outbreak of war, had a maximum bomb load of 8,000 pounds and was, by the standards of the time, a true heavy bomber, but the maximum bomb loads of the Hampden and the Wellington (4,500 pounds), and older Whitleys, were much the same as the contemporary German medium bomber, the Heinkel He 111. Moreover, only seventeen of Bomber Command's thirty-three operational squadrons in September 1939 had Whitleys, Hampdens or Wellingtons. The rest had 'medium' bombers, Blenheims or Battles, with maximum loads of 1,000 pounds, and the ten squadrons equipped with Battles had to be based in France on account of their short range. As a new generation of heavy bombers began to appear in 1940, the Battle and Blenheim were reclassified as light bombers. The four-engined Stirling (maximum bomb load 14,000 pounds) and Halifax (13,000 pounds), and the twin-engined Manchester (10,350 pounds) represented a huge technological advance, but development of these aircraft and their introduction into service, took longer than expected. The first sorties by the new bombers did not take place until February 1941, and both the Stirling and the Manchester were plagued with technical problems. The Lancaster, a four-engined version of the Manchester, on the other hand, proved to be a great success from its entry into service in the spring of 1942. With a maximum bomb load of 14,000 pounds, the Lancaster formed the backbone of Bomber Command from 1943. By February 1943 Bomber Command had grown

¹⁴ Sir Arthur Harris, *Despatch on War Operations 23rd February, 1942, to 8th May, 1945*, 18 Dec. 1945, with Air Staff memorandum on the despatch, March 1948, ed. Sebastian Cox (London: Frank Cass, 1995), esp. pp. 30, 205; Webster and Frankland, *Strategic Air Offensive*, vol. I, pp. 178–83, 323; vol. III, p. 124; vol. IV, pp. 3–17, 37–8.

¹⁵ Webster and Frankland, *Strategic Air Offensive*, vol. III, pp. 77–80.

from the thirty-three squadrons of September 1939 to sixty-two squadrons and in 1944 and 1945 there was a daily average of over 1,000 bombers available.¹⁶

Before the war the Air Staff had tended to rate the effectiveness of bombers in terms of the size of their bomb loads. However, in 1938 the de Havilland Company began designing a revolutionary high-speed bomber, built of wood to economise on strategic metals and to facilitate manufacture by sub-contractors. Air Ministry interest was aroused only after the outbreak of war, but the resulting aircraft, the Mosquito, had an outstanding performance, being able to evade German fighters by day yet able to carry a 2,000-pound bomb load (5,000 pounds in later versions). From 1942 it carried out frequent nuisance raids on Berlin and from 1943 played an important role in the Oboe system for guiding heavy bombers to their targets. It was a versatile aircraft, with photo-reconnaissance, night-fighter and long-range fighter variants. In its bomber version it had the best performance of any British aircraft in terms of weight of bombs dropped per man-hour employed in its construction, and was to that extent a better investment than any of the heavy bombers.¹⁷

Was there an alternative to the night-bombing tactics employed by Bomber Command? The United States Army Air Force (USAAF) was likewise a believer in the strategic air offensive but preferred to attempt precision bombing by day.¹⁸ American heavy bombers carried heavier defensive guns than their British counterparts (0.5-inch calibre compared with 0.303-inch) but encountered heavy losses when they operated beyond the range of fighter escorts. Until the summer of 1943 American fighters could not operate much beyond the French coast but the introduction of disposable (drop) fuel tanks allowed them to escort bombers across Germany. At first, the supply of drop tanks was limited but by the beginning of 1944 the Americans were able to take the offensive against German fighters. It could be argued that the British should have followed the American example. However, to be as well able to defend themselves as the Americans, British bombers would have had to be re-equipped with 0.5-inch guns. Harris ordered such guns but they were delivered only in limited quantities towards the end

¹⁶ Ibid., vol. III, p. 124n; vol. IV, pp. 400–2, 407, 450–1.

¹⁷ Postan, Hay and Scott, *Design and Development*, pp. 84–6, 131–2; Webster and Frankland, *Strategic Air Offensive*, vol. II, pp. 111–12, 199–201; vol. IV, pp. 7–8.

¹⁸ For a comparison of the development of doctrine on bombing in Britain and the United States, see Tami Davis Biddle, 'British and American approaches to strategic bombing: their origins and implementation in the World War II combined bomber offensive', *Journal of Strategic Studies*, 18 (1995), no. 1, 91–144.

of the war. Moreover, a change of tactics would have required retraining of aircrew. Bomber Command had evolved as a night bombing force and its continued resort to area bombing was an example of path dependency.¹⁹ In any case, as W. Hays Park has pointed out, Bomber Command attacks, when directed at a specific target, were often more accurate than those carried out by day, but in cloudy conditions, by the USAAF. Much depended upon the level of enemy opposition, and the difference in bombing accuracy between the two air forces was not as great as is often believed.²⁰

In contrast to the long-drawn out problems in making strategic bombing effective, the RAF had a model air defence system in place by the outbreak of war, with a comprehensive radar early warning system, underground operations rooms to direct fighters, and high-speed monoplanes, as well as the older technology of anti-aircraft guns, searchlights and, as part of London's defences, a balloon barrage. Well-directed fighter interceptions of German bombers were decisive in preventing the Germans achieving air superiority. It was fortunate that radar was so new in 1940 that no one had yet worked out how to jam it or how to evade detection by low-level flight. The Germans were also pioneers of radar, but their efforts to guide bombers to targets by radio beams were quickly frustrated by British signals and scientific intelligence.²¹

The Spitfire was the only operational aircraft in the world that was the equal of the German Messerschmitt Bf 109 in 1939–40, but British fighter development was not without its problems. Britain was the only country to design fighters with a powered turret that allowed four machine guns to be brought to bear in a broadside, but the experiment was not a success. The performance of these single-engined aircraft, the Defiant for the RAF and the Roc for the FAA, suffered from the weight and drag of the turret, and the Roc was withdrawn from service shortly after being issued in small numbers to squadrons. German fighters quickly discovered how to evade the Defiant's guns, which could only fire to the rear or side, and it was withdrawn from daylight operations in the summer of 1940, even though Fighter Command was then desperately short of aircraft. However, the Defiant found its niche as a night-fighter. Most night-fighters pressed into service in the winter of 1940–1 were

¹⁹ A familiar concept to economic historians: for example, the standard gauge for railways adopted in the nineteenth century and still used in Britain today was originally that adopted for horse-drawn wagons. Once a particular course of action has been taken the costs of changing it may exceed the short-term (although not necessarily the long-term) benefits.

²⁰ W. Hays Park, "Precision" and "area" bombing: who did which, and when', *Journal of Strategic Studies*, 18 (1995), no. 1, 145–74.

²¹ R. V. Jones, *Most Secret War* (London: Hamish Hamilton, 1978), esp. pp. 135–80.

converted twin-engined light bombers. The most successful improvisation was the Bristol Beaufighter, which was a redesign of the Beaufort torpedo-bomber with more powerful engines and armament, and which later also served in the fighter-bomber and anti-shipping roles.²²

In early 1940 an Air Staff assessment of German aircraft production led to concern that the RAF might be seriously outnumbered. Consequently, on 15 May the Minister of Aircraft Production, Lord Beaverbrook, and the Air Staff agreed that all aircraft development that could not be directly related to immediate needs should be held back, to allow a concentration of output on five types: the Hurricane, Spitfire, Blenheim, Wellington and Whitley. The new heavy bombers were not affected by this decision, and important developments took place with fighter aircraft, such as the fitting of cannon to the Hurricane and Spitfire, and radar to night-fighters. However, work on more advanced types was suspended for about nine months, the aircraft affected including the Typhoon, Hawker's intended successor for the Hurricane. Thereafter, the Air Staff's wish to introduce the Typhoon into service as quickly as possible resulted in squadrons receiving an inadequately developed aircraft, with some unpleasant flying characteristics. It eventually proved to be a successful fighter-bomber, although a failure as an interceptor. Both the Typhoon and its successor, the Tempest, suffered from the long-drawn-out development of the Sabre engine designed by Napier's. Indeed the inadequacy of Napier's in this respect led to the enforced transfer of the work to the English Electric Company. Fortunately the basic Spitfire proved to be capable of development through twenty-two marks and two different types of Rolls-Royce engines, the maximum speed of the 1945 mark being 454 miles per hour, about 90 miles per hour faster than the one in service in 1940. The Spitfire always had the edge over the Messerschmitt Bf 109, although it too was developed throughout the war. However, the Focke-Wulf Fw 190 gave the *Luftwaffe* a margin of ascendancy in fighter-versus-fighter combats when it appeared in large numbers in 1942.²³

Germany was ahead of Britain in the development of jet aircraft. The turbo-jet engine was invented independently in each country, the first experimental aircraft flying in 1939 in Germany and in 1941 in Britain, and the first fighter prototypes following in 1941 and 1943 respectively. Fortunately the Germans, like the British, for a time gave priority to developments for immediate needs rather than long-term projects, and

²² William Green, *War Planes of the Second World War*, 10 vols. (London: MacDonald, 1960-68), vol. II, pp. 4-5, 11-25.

²³ Postan, Scott and Hay, *Design and Development*, pp. 6-8, 26.

then Hitler insisted that the Messerschmitt Me 262 be used to carry bombs rather than be employed as an interceptor. The first British jet fighter, the Gloster Meteor, entered service in the same year as the Me 262, 1944, but by then the only serious air threats to Britain were the German *Vergeltungswaffe* (reprisal) weapons, the V1 jet-propelled flying bomb, which could be shot down by fighters or by anti-aircraft fire, and the rocket-powered V2 missile, which could not. The deployment of the V1 and V2 was delayed by bombing their launch sites, an example of successful employment of bombing as a defensive measure, and incidentally of Bomber Command's ability to hit very small and well-concealed targets by 1944.²⁴

Britain was also slow to develop tactical air warfare, reflecting the Air Staff's long-standing wish to be independent of the other services. Sir John Slessor, the director of plans from 1937 to 1940, had delivered a series of lectures at the Staff College at Camberley between 1931 and 1934 in which he used experience from the First World War to demonstrate how bombers could isolate an army from its supplies and delay its concentration.²⁵ Nevertheless, Air Staff doctrine in 1940 held that supply lines would be hard to hit and that battlefield targets were better attacked by artillery. Consequently, when the RAF was called upon to intervene directly in support of the BEF in Belgium and France in May and June 1940, air crews lacked the necessary training and there was no system in place for communication between ground and air forces, so that hours might pass before aircraft would attack a target identified by the army.²⁶ The USAAF, in contrast, combined a belief in strategic bombing with effective preparation for the employment of tactical air power. The American attack planes, first designated as such in 1922, corresponded in size to British light bombers, but were designed for immediate support of ground troops, while medium bombers were developed to attack targets such as depots and communications.²⁷ When the RAF at last made effective use of tactical air power, checking the flow of supplies to the enemy's front-line troops prior to the battle of El Alamein in 1942, it made extensive use of American aircraft.²⁸ By 1944 the RAF had created a workable system of

²⁴ Harris, *Despatch on War Operations*, p. 30. ²⁵ Slessor, *Air Power and Armies*.

²⁶ Richard Overy, *Air Power, Armies, and the War in the West, 1940*, Harmon Memorial Lectures, no. 32, United States Air Force Academy, Colorado, 1989.

²⁷ Wesley F. Craven and James L. Cate (eds.), *The Army Air Forces in World War II*, 7 vols. (University of Chicago Press, 1948–58), vol. VI, pp. 197–201.

²⁸ Sir Arthur Tedder, *With Prejudice* (London: Cassell, 1966), pp. 205–7, 342, 347–8, 354–61.

close air support which, although imperfect, was greatly in advance of anything that the British army had enjoyed earlier in the war.²⁹

The Air Staff also neglected the development of aircraft and weapons for Coastal Command, which was charged with co-operating with the navy in coastal patrols and anti-submarine operations. The four-engined Sunderland flying boat was one of the best in the world, but the twin-engined Saunders-Roe Lerwick was underpowered and saw service only briefly. The land-based Anson was too small to undertake long-range anti-submarine patrols and was regarded even in 1937 as fit only to be a trainer. The first American combat aircraft ordered for the RAF (in 1938) was the Hudson, which was originally thought of as a stop-gap until the Blackburn Botha replaced the Anson, but the Botha was not an operational success, leaving Coastal Command short of modern aircraft in what proved to be a crucial period of the Battle of the Atlantic in 1940–1. Significantly, the development of the Lerwick and the Botha had been allocated to two of the weakest aircraft firms, suggesting a low priority. The shortfall in modern aircraft could have been filled with Wellingtons and Whitleys, which were later successfully adapted for anti-submarine warfare, but higher priority was given to the strategic air offensive against Germany than to the needs of Coastal Command. The most spectacular failure of the Air Ministry in relation to anti-submarine warfare, however, was the anti-submarine bomb, which was ordered off the drawing board in 1934 and never tested against a submarine before the war. The bomb proved to be ineffective and had to be replaced by a modified naval depth-charge in the late summer of 1940. It was not until late 1941 that really effective, purpose-built aerial depth-charges were produced in quantity. Coastal Command aircraft also relied upon visual sighting of U-boats until aircrew were trained to use air-to-surface radar in 1941. Unsurprisingly, the first successful attack by a Coastal Command aircraft on a U-boat was not until November 1941. Even in 1939–41, however, aircraft could give some protection to a convoy, as in the First World War, by spotting submarines and reporting them to escort vessels. Coastal Command did not begin to come into its own until 1942, by which time it was beginning to receive American aircraft with sufficient range to operate far out over the Atlantic. German admirals identified aircraft as the chief enemy of the U-boat by 1943.³⁰

²⁹ Ian Gooderson, *Air Power at the Battlefront: Allied Close Air Support in Europe 1943–45* (London: Frank Cass, 1998).

³⁰ John Buckley, *The RAF and Trade Defence 1919–45: Constant Endeavour* (Keele University Press, 1995), esp. pp. 97, 101–6, 128–30, 166–8; John Buckley, 'Air power and the Battle of the Atlantic', *Journal of Contemporary History*, 28 (1993), 141–61;

Naval weapons and tactics

The Admiralty was inclined to blame Air Ministry administration of the FAA down to 1937 for the lack of modern aircraft for the five aircraft carriers launched between 1937 and 1940.³¹ Nevertheless, the Admiralty bore some responsibility. Even under the pre-1937 arrangements it drew up specifications for naval aircraft and provided the funds for the numbers it required. Almost all aircraft ordered for the FAA before the war carried a crew of two or three, partly because machines capable of bombing and reconnaissance as well as fighting maximised the limited capacity of an aircraft carrier, but also because the Admiralty believed that naval aircraft required a navigator. It was only after the development of electronic homing beacons and radar-equipped command and control in 1941–2 that single-engined fighters were widely used at sea. Until then carriers relied upon anti-aircraft guns for their defence. Of the 189 aircraft aboard operational carriers in 1939 only 12 were single-seat fighters (and these were obsolescent Gladiator biplanes), whereas 147 were Fairey Swordfish or Albacore torpedo-bombers that were slow enough to carry out spotting duties for the big guns of battleships. The only monoplanes in service were the Skua dive-bomber and its unsuccessful turret-fighter variant, the Roc. A further source of FAA weakness lay in the nature of the two firms that specialised in designing and producing naval aircraft: Blackburn and Fairey. Although Fairey had been a successful designer of aircraft in the 1920s, both it and Blackburn encountered technical problems with their more advanced designs in the 1930s. Both firms received orders for a number of different types – probably more than their design staffs could cope with. At all events, the official historians commented that the field of aircraft development in which ‘failures occurred and hopes were deferred most frequently’ was that of naval types developed by Blackburn and Fairey.³² Consequently the FAA came to rely heavily during the war on American types.

Pre-war fighting instructions for the FAA required it to locate the enemy fleet at sea and to slow it down with a torpedo attack so as to enable British surface forces to bring it to battle. The Fairey biplanes may have been obsolescent but they achieved all that they were intended to do, and more. Carrier-borne torpedo-bombers sank three Italian battleships at their moorings at their base at Taranto in November 1940;

G. H. Bennett and R. Bennett, *Hitler's Admirals* (Annapolis, Md: Naval Institute Press, 2004), pp. 138, 146, 177, 179.

³¹ For example, First Sea Lord, Sir Roger Backhouse, to First Lord, the Earl of Stanhope, 24 Mar. 1939, ADM 205/3, TNA.

³² Postan, Hay and Scott, *Design and Development*, p. 133.

successfully damaged Italian warships off Cape Matapan in March 1941, enabling British surface ships to overtake and sink three 8-inch gun cruisers and two destroyers; and during the hunting of the German battleship *Bismarck* in May 1941 damaged its steering gear, preventing it from making good its escape from the British fleet.

British aircraft carrier design compared favourably in some respects with other navies. Whereas the hangar for aircraft on American and Japanese carriers was part of a large, vulnerable superstructure, the hangar in British ships was an integral part of the main structure, protected by flash-proof lobbies, so that no British-built carrier was lost as a result of a fuel explosion or hangar fire like the brand-new Japanese carrier *Taiho* in 1944.³³ British carriers sacrificed aircraft complement for armoured protection, and whereas both American and Japanese carriers proved to be vulnerable to air strikes, only the old, small British carrier *Hermes* was lost in this way. New construction kept up with losses: five carriers were sunk, but six fleet carriers and four light fleet carriers had been completed by the end of the war. One omission was the failure to foresee the part that escort carriers could play in protecting convoys from air and submarine attack. Escort carriers could be converted from merchant hulls and could be fitted out to lower standards than fleet carriers, by having wooden decks, for example. The first such carrier did not see service before September 1941. The Ministry of War Transport was reluctant to release the large, fast ships required for conversion, not realising that the long-term reduction in shipping losses resulting from the operations of escort carriers would have justified the immediate sacrifice of freight-carrying capacity. Consequently, most of the Royal Navy's escort carriers were built in the United States.

The war is generally seen as the twilight of the capital ship. Stephen Roskill, in his official history, concluded that the navy had not achieved a proper balance in 1939 between capital ships and aircraft carriers.³⁴ However, no major navy abandoned the construction of capital ships before the war, and international comparison of capital ships and aircraft carriers launched between 1936 and 1945 (table 4.1) does not suggest that the Royal Navy was unusually conservative. The German navy's 'Z Plan' of January 1939 aimed at having a fleet of six battleships and two battle-cruisers, but only two aircraft carriers, by 1944.³⁵ In

³³ David Hobbs, 'Naval aviation, 1930–2000', in Richard Harding (ed.), *The Royal Navy, 1930–2000* (London: Frank Cass, 2005), pp. 69–88, at pp. 73–4.

³⁴ Stephen Roskill, *The War at Sea 1939–1945*, 3 vols. (London: HMSO, 1954–61), vol. III, part 2, p. 396.

³⁵ Maiolo, *Royal Navy and Nazi Germany*, p. 74.

Table 4.1. *Capital ships and aircraft carriers launched or converted, 1936–45*

	Britain	France	Germany	Italy	Japan	United States
Capital ships	6	3	4	4	3	13
Fleet aircraft carriers	24	0	1	1	16	41

Source: Chesneau (ed.), *Conway's All the World's Fighting Ships 1922–1946*.

the event, four of the battleships and both the aircraft carriers were cancelled after the outbreak of war, to allow construction to be concentrated on U-boats. In 1940 the Royal Navy cancelled four out of five of the capital ships that could not be ready by 1942. However, it continued aircraft carrier construction on a large scale. The five 'King George V'-class capital ships completed during the war, were not an over-insurance against the four capital ships completed by the Germans from 1939 (including the pre-war 'Scharnhorst'-class battle-cruisers), or the three capital ships completed by the Italians from 1940. Indeed, because the 'King George V' class were designed within the Washington treaty limit of 35,000 tons, they were inferior to the 42,000-ton *Bismarck* and *Tirpitz*, and British capital ships had to go in pairs when they were liable to meet these German leviathans. The increasing range of aircraft and radar progressively restricted the ability of large surface vessels to operate without air cover, but capital ships could still pose a threat in distant waters, particularly to the Arctic convoys to Russia prior to the sinking of the *Scharnhorst* by surface warships of the Home Fleet off the North Cape on 26 December 1943, and the destruction of the *Tirpitz* by RAF bombers on 12 November 1944.

Roskill's criticism was also directed at the cost of maintaining and modernising the older battleships. Priority had been given between the wars to modernising the five vessels of the 'Queen Elizabeth' class, on account of their high speed. Anti-aircraft guns were added, the elevation of the main guns increased and in four cases new engines were fitted. The modernisation programme was incomplete when war broke out, but the three ships of this class that were wholly or partially rebuilt (*Queen Elizabeth*, *Valiant* and *Warspite*) played a prominent part in the war, particularly in the Mediterranean. On the other hand, the five vessels of the 'Royal Sovereign' class proved to be an example of false economy. To save money, they had been designed to be slower and smaller than the earlier 'Queen Elizabeth' class, and proved to be less adaptable to modern requirements. They were little altered by 1939, apart from the addition of anti-aircraft guns. During the first twelve months of the war Churchill pressed from time to time for them to be

reconstructed for coastal bombardment purposes, but the Admiralty refused.³⁶ On balance there does not seem to be much substance in Roskill's complaint about expenditure on the older battleships; indeed completion of the rebuilding programme for the 'Queen Elizabeth' class would have been money well spent.

The well-known sinking of the modern battleship *Prince of Wales* and the old battle-cruiser *Repulse* off the coast of Malaya by Japanese aircraft on 10 December 1941 might be taken as justifying the RAF's position in the bomber versus the battleship controversy between the wars. However, British battleships survived many air attacks in the Mediterranean, from the *Luftwaffe* as well as the *Regia Aeronautica*, and one must conclude that the Japanese aircrews had better training than their Axis partners. Nor was air attack the only hazard: of the three other British capital ships lost during the war, two were sunk by U-boats and one, the battle-cruiser *Hood*, was sunk by the *Bismarck*'s gunfire on 24 May 1941. The proportions for aircraft carrier losses were similar: three to U-boats, one to gunfire, and one to Japanese air attack. The overshadowing of capital ships by aircraft carriers by the end of the war was not so much evidence of the vulnerability of the former as at 1939, as of the growing utility of the latter, as the range and performance of aircraft and radar improved.

As regards trade protection, cruisers played less of a role than the navy expected, particularly once improvements in aircraft and radar had made it harder for surface raiders to evade detection after 1941.³⁷ Contrary to the inter-war Admiralty's expectations, the chief threat to merchant shipping came from submarines. The Admiralty had great expectations of Asdic, which relied upon sound waves being sent through water. However, Asdic was practically useless if a U-boat remained on the surface. At first the Germans were unaware of this characteristic, and the system worked well, especially if Asdic-equipped ships were assisted by aircraft that could spot submarines when they surfaced. However, from September 1940 U-boats regularly used the tactic of attacking on the surface by night, when they were able to evade detection.³⁸ The numbers of escort vessels required consequently far exceeded pre-war estimates. The difficulties of trade defence were also greater than expected because no one in Whitehall had anticipated that the Germans would be able to operate from ports in western France,

³⁶ Churchill, *Second World War*, vol. II: *Their Finest Hour* (1949), pp. 393, 583, 591.

³⁷ Bennett and Bennett, *Hitler's Admirals*, pp. 100–1.

³⁸ Roskill, *War at Sea*, vol. I, pp. 34, 56, 68, 130, 355.

spending more time in the Atlantic than would otherwise have been possible.

What Churchill called the Battle of the Atlantic proved to be a long struggle that was won by the Allies only because of improved techniques for detecting and attacking submarines, and signals intelligence. The breaking of the German navy's Enigma code by June 1941, partly as a result of the work of cryptanalysts and partly as a result of the capture of signal books aboard *U110* in May, made it possible to read quickly all orders to 'wolf packs' of U-boats. Convoys could then be re-routed and the U-boats attacked. Shipping losses in July 1941 were only a third of those in the previous month. However, in September 1941 the Germans broke the British naval code, enabling them to locate convoys, and in February 1942 made their own code indecipherable. Then, from December 1942, British cryptanalysts were once more able to break the German U-boat code, to the point that by May 1943 German orders could once more be read quickly enough for action to be taken by convoys and anti-submarine forces.³⁹ However, Jock Gardner has warned against any monocausal explanation of victory: signals intelligence was of tactical value only when U-boats operated in groups, which they did only in 1941 and from mid-1942 to May 1943. Other factors included more convoy escorts with better means of detecting submarines, and long-range aircraft equipped with radar that could locate U-boats by day and night.⁴⁰ The technology of submarine warfare moved in favour of the Germans later in the war, first with the fitting of *schmorkel* to U-boats in 1943–4, enabling them to recharge batteries under water, and then with the introduction in 1945 of new types of U-boats capable of high speed under water. The Admiralty anticipated heavy shipping losses in 1945 but victory on land ended the U-boat threat.⁴¹

Army weapons and tactics

The performance of the British army in the Second World War has been criticised on two broad grounds: first, its tactical doctrine; second, its equipment. According to Elizabeth Kier, defeat by the Germans in 1940 was the result of the British army's 'defensive' doctrine, whereby superior firepower was a pre-condition of manoeuvre, the purpose of tanks was to support the infantry, and the mobile or armoured division

³⁹ F.H. Hinsley, *British Intelligence in the Second World War*, 3 vols. (London: HMSO, 1979–88), vol. II, pp. 163, 170–9, 547–53, 570–2.

⁴⁰ Gardner, W.J.R., *Decoding History: The Battle of the Atlantic and Ultra* (Basingstoke: Macmillan, 1999).

⁴¹ Roskill, *War at Sea*, vol. III, part 1, p. 18; part 2, pp. 285–6, 289–91.

was 'more a reconnaissance unit than an independent striking force'. She attributes defensive doctrine not only to the lack of a continental commitment before 1939, but also to 'civilian fear of a professional army', and the continuation of a military culture based on 'the gentleman-officer over the professional soldier'.⁴² However, there was little evidence of defensive doctrine in December 1940 when General Sir Archibald Wavell launched an audacious offensive in Egypt with one armoured division and an Indian infantry division and defeated an Italian army of seven divisions, taking 130,000 prisoners.⁴³ The evidence for a lack of professionalism on the part of Regular Army officers is likewise unconvincing, being largely an impression created by Liddell Hart and historians influenced by him or by tank radicals like Percy Hobart.⁴⁴ Reliance on firepower, such as the artillery bombardment that preceded the battle of El Alamein in October 1942, was not in itself unsound. Indeed British tanks, for all their mechanical deficiencies, might have fared a good deal better earlier if their efforts had been more closely co-ordinated with the artillery. J. P. Harris has convincingly argued that the trouble with British tank tactics was not that the army had ignored the ideas of tank radicals, but rather that men like Hobart, who believed that tanks should act independently of other arms, had had too much influence.⁴⁵

David French has recently studied the question of British army doctrine afresh. He finds that the lesson drawn from the experience of 1914–18 was that success required the proper combination of all arms. Overwhelming firepower to suppress enemy fire was seen as the means to restore movement across the battlefield, and there was nothing inherently defensive about such doctrine, even if it was designed to minimise casualties. Unfortunately, until late 1942, the army lacked the weapons to make its doctrine effective. French also attributes shortcomings in the practice of the army's doctrine to a decentralised system of training rather than to lack of professionalism among officers. The rapid expansion of the army after 1939 compounded difficulties in training. However, he notes that at El Alamein artillery, infantry, sappers and tanks were able to combine effectively in a night attack, and

⁴² Elizabeth Kier, *Imagining War: French and British Military Doctrine between the Wars* (Princeton University Press, 1997), pp. 89–90, 93, 109.

⁴³ I. S. O. Playfair and others, *The Mediterranean and the Middle East*, 6 vols. (London: HMSO, 1954–88), vol. I, pp. 258–98, 351–64.

⁴⁴ Kier cites Liddell Hart in support of her thesis four times (*Imagining War*, pp. 91, 100–1, 119–20, 195n.). She also relies upon Kenneth Macksey's *Armoured Crusader: A Biography of Major General Sir Percy Hobart* (London: Hutchinson, 1967), which is less than even handed in its criticism of those who had to deal with Hobart.

⁴⁵ Harris, *Men, Ideas and Tanks*, pp. 289–90, 306–7, 316–19.

that by 1943 British ground–air co-operation and artillery support were far in advance of German techniques. The British army's highly centralised command and control system lacked the flexibility of German practice, but was operating more expeditiously by 1944 than previously. After a difficult learning curve in 1940–2, the British army became skilful enough to contribute effectively to Allied offensives in 1942–5.⁴⁶

Of all the weapons in which the British army was deficient, none attracted more attention than tanks. Defeats in the Western Desert in the first six months of 1942 were attributed by the British commander, General Sir Claude Auchinleck, to the inferiority of British tanks compared with those of the Germans.⁴⁷ As noted in chapter 3, the pre-war development of British tanks had been far from smooth. Nevertheless, they were inferior to their German counterparts in 1940 only in mechanical reliability. The Germans tested British tanks captured after Dunkirk and found that the Infantry Mark II (Matilda) was immune at longer ranges to all of their guns except the 88-mm Flak gun. They decided to replace the 37-mm gun on their *Panzerkampfwagen* (*Pzkw*) III light medium tank with a 50-mm weapon and to increase the armour on it and the *Pzkw* IV medium tank, with the result that in 1941 the British found that the 2-pounder tank and anti-tank gun were ineffective except at the closest ranges. Further improvements in the guns and armour of German tanks were made in 1942. Unfortunately, the British had taken a decision in 1940 to go for quantity in tank and anti-tank guns at the expense of further development, in order to replace weapons lost at Dunkirk as quickly as possible. Production of the 2-pounder tank and anti-tank gun was continued and the introduction of the 6-pounder into service delayed. It was not until May 1942 that the standard cruiser tank, the Mark VI Crusader, was fitted with the heavier weapon. The Crusader was so mechanically unreliable that in the spring of 1942 it was the subject of a special enquiry under Attlee, which concluded that it had been placed into production too quickly before the pilot model had been adequately tested. The same might have been said of other British tanks, including the Cruiser Mark V Covenanter, which was never used in battle, although 1,771 were produced, and early models of the Infantry Mark IV Churchill. The only moderately successful British tank in production in 1941–2 was the Infantry Mark III Valentine, which was faster than the Matilda, which it replaced, and more reliable than the Crusader. Even so, as with the Crusader, it had only the

⁴⁶ French, *Raising Churchill's Army*.

⁴⁷ Sir Claude Auchinleck, despatch on 'Operations in the Middle East from 1st November, 1941, to 15th August, 1942', *London Gazette*, no. 38177, 15 Jan. 1948.

2-pounder gun until models armed with 6-pounders were shipped out to Egypt in time for the battle of El Alamein.⁴⁸

Fortunately, the Eighth Army was able to use American medium tanks in 1942, the Grant from May and the Sherman from October. Both carried 75-mm guns, the Grant in a sponson with a limited arc of fire, and the Sherman in its turret. The Sherman was rated by its crews as superior to the contemporary German Mark III and IV tanks. The only British-designed cruiser tanks that were better than the Sherman were the Cromwell, when fitted with a 75-mm gun, with which it first went into action in June 1944, and the Comet, with a 77-mm gun and new gun-laying devices, about six months later. The belated improvement in British tanks followed tacit recognition that the decision in 1936 to divide development into 'infantry' and 'cruiser' types had been a mistake. Following Anglo-American discussions in the late summer of 1942, both countries agreed that the main requirement was for an all-purpose tank, and later British tanks combined the best features of the infantry and cruiser types, being adequately armed and fast, and having a longer range than German tanks. Even so, British tank crews faced a formidable challenge when they encountered the latest German tanks in the latter stages of the war. The Panther (42 tons) and the Tiger (54 tons) were much larger and more heavily armoured, and the Tiger more heavily armed, than the Cromwell (28 tons) or the Churchill (40 tons). To make matters worse, experience in North Africa of enemy anti-tank guns, which had to be attacked with high-explosive rather than armour-piercing shells, had led the British to adopt an American-designed, dual-purpose 75-mm gun, which proved to be inadequate against the Panther and Tiger. Although the problem had been anticipated and harder-hitting 17-pounder guns fitted to about a quarter of the tanks employed by the British army in Normandy, the Germans enjoyed an advantage in tank-to-tank combat, especially given the combustibility of the Sherman when hit by an armour-piercing shell. On the other hand, the lack of range of the Panther and Tiger made them vulnerable when their fuel supplies were severed, and many were abandoned or destroyed by their own crews in the later stages of the Normandy campaign.⁴⁹

Ironically, in view of the charge that British army doctrine was defensive in nature, the deficiencies of its infantry weapons could be linked to the priority given to mobility at the expense of firepower.

⁴⁸ Playfair, *Mediterranean and the Middle East*, vol. II, pp. 173–5, 341–5; vol. III, pp. 214, 434–43; Postan, Hay and Scott, *Design and Development*, pp. 334–9.

⁴⁹ John Buckley, *British Armour in the Normandy Campaign 1944* (London: Frank Cass, 2004); French, *Raising Churchill's Army*, pp. 100–5; Postan, Hay and Scott, *Design and Development*, pp. 329–30, 341.

British infantry were outgunned by German infantry with heavier machine guns and mortars, which led to a natural reluctance to advance unless artillery support was available to suppress the enemy fire.⁵⁰ Fortunately, the British artillery had a reliable and robust weapon in the 25-pounder field gun, which had been ordered in 1938. On the other hand, the medium and heavy guns available in 1939–40 were modernised First World War weapons and it was only in 1942 that the production of new models enabled the British to achieve artillery superiority, and even then the range of their howitzers was often too short for effective counter-battery work.⁵¹ The disadvantage of earlier reliance upon older medium and heavy guns was, of course, compounded by the RAF's lack of interest in tactical air power before 1942.

War economy and finance

As will have been apparent from the survey of armaments and tactics, war was more than simply an industrial undertaking. Its outcome, nevertheless, depended upon mobilising economic resources to secure the output of munitions, all the more so if inferior quality of weapons had to be compensated for by quantity. However, the Second World War, even more than the First, also made immense demands on the nation's scientific resources. The technology of war, particularly but not only with regard to electronics, was constantly changing. Britain was fortunate in being able to draw upon both the scientific and industrial resources of the United States. However, transatlantic links were not all one way. Radar was invented first by the British, although its subsequent development in the United States was impressive. The best American fighter aircraft, the P-51 Mustang, used the Rolls-Royce Merlin engine, and the first American jet fighter was designed around an imported de Havilland engine.⁵²

David Edgerton sees the dominant feature of the war economy as the expansion of a greatly enlarged military-industrial complex. Although overtaken by the United States during the war, Britain was the world's leading producer of aircraft and warships in 1940. Yet in the summer of 1939 Britain had set about creating industrial capacity to supply an army much larger than had been planned earlier – hence the creation of

⁵⁰ French, *Raising Churchill's Army*, pp. 86–9.

⁵¹ J. B. A. Bailey, *Field Artillery and Firepower* (Annapolis, Md: Naval Institute Press, 2004), pp. 290, 303–21.

⁵² Craven and Cate (eds.), *Army Air Forces*, vol. VI, pp. 218–19, 328; H. Duncan Hall, C. C. Wrigley and J. D. Scott, *Studies of Overseas Supply* (London: HMSO, 1956), pp. 386–413.

a Ministry of Supply in August 1939 to meet the army's needs. A Ministry of Aircraft Production followed in May 1940. Both ministries, like the Ministry of Munitions in the First World War, recruited businessmen. However, there were other links between state and industry. Edgerton estimates that perhaps half of all munitions were produced in government-owned factories built since the 1930s, or with specialist machines supplied by the government. Private firms acted as agents managing government factories, an arrangement that persisted into the 1960s. Shipyards were modernised during the war, largely at government expense, with a remarkable extension of welding in place of riveting being the most visible evidence of progress. Defence-related research and development expanded, building upon the pre-war experimental facilities of the defence departments and their links with the arms industry and the universities. The pre-war military-industrial complex had already developed Asdic and radar, and the number of researchers employed or paid for by the state expanded markedly after 1939. Scientists became established in Whitehall no less securely than the better-known example of economists.⁵³

The input of science and technology could be crucial to the quality of munitions, as the example of radar and other electronic aids showed in weapons developed for air defence, strategic bombing or anti-submarine warfare. Thus comparison of the effectiveness of war production in different countries, or even as between different years, is far from easy, and certainly not reducible to counting aircraft, guns or ships. After the war German admirals complained that Germany had lagged behind the Anglo-Saxon powers in the development of radar in the war at sea; the same was generally true in the air war.⁵⁴ This Allied advantage influenced the performance of aircraft and ships in ways not revealed by the usual indicators of armament or speed.

Even when one has apparently comparable statistics, as for aircraft production, the totals have to be broken down, given the very different requirements that Britain and Germany had for aircraft capable of co-operating with the navy or army. Table 4.2 gives figures for output of fighters and bombers, the two principal combat categories, and when reading them one should remember that the relative cost of fighters and bombers was roughly in the ratio 1:4. Britain overtook Germany in total production in 1940, and in bomber production in 1941. Germany overtook Britain in total production in 1944, on account of a huge surge

⁵³ Edgerton, *Warfare State*, chs. 2–4. For shipyards, see Lewis Johnman and Hugh Murphy, *British Shipbuilding and the State since 1918: A Political Economy of Decline* (University of Exeter Press, 2002), esp. p. 82

⁵⁴ Bennett and Bennett, *Hitler's Admirals*, pp. 180–1; Overy, *Air War*, pp. 201–2.

Table 4.2. *British and German aircraft production, 1939–44*

	Total	Fighters	Bombers
<i>Britain</i>			
1939	7,940	1,324	1,837
1940	15,049	4,283	3,488
1941	20,094	7,064	4,668
1942	23,672	9,849	6,253
1943	26,263	10,727	7,728
1944	26,461	10,730	7,903
<i>Germany</i>			
1939	8,295	1,856	2,877
1940	10,826	3,106	3,997
1941	11,776	3,732	4,350
1942	15,556	5,213	6,539
1943	25,527	11,738	8,589
1944	39,807	28,926	6,468

Sources: Postan, *British War Production*, pp. 484–5; Webster and Frankland, *Strategic Air Offensive*, vol. IV, pp. 494–5.

in fighter production. Germany had also produced more bombers than Britain in 1943, but whereas 4,615 of the British output had been heavy bombers, only 261 German machines came into this category, on account of delays in developing the He 177.⁵⁵ The patterns of output also reflected strategy: in Britain's case, emphasis on defensive fighters in 1940, but increasing emphasis on bombers for the air offensive against Germany; in Germany's case, increasing emphasis on fighter production in response to the Allied air offensive. Output, and the industrial investment necessary to achieve it, could also reinforce strategy. When the question arose of whether the strategic air offensive should continue, given that resources might be better employed in preparing for a second front, the Air Staff was able to point out in February 1942 that the aircraft industry was committed to the production of heavy bombers, and that a change of policy would disrupt output and reduce pressure on Germany.⁵⁶

The statistics for tank output seem to show Britain lagging behind Germany (table 4.3). However, British production was on the basis of supplying 55 divisions, including those of the dominions and allies, and most of these units were only being formed in 1939–40. Germany used 136 divisions against France and the Low Countries in May 1940; by

⁵⁵ Postan, *British War Production*, p. 485; Green, *Warplanes of the Third Reich*, p. 343.

⁵⁶ Webster and Frankland, *Strategic Air Offensive*, vol. I, p. 330.

Table 4.3. *Production of tanks and self-propelled artillery on tank chassis, 1939–44*

	UK production	Supplied from overseas ^a	Germany
1939	969	0	1,300
1940	1,399	0	2,200
1941	4,841	1,390	5,200
1942	8,611	9,253	9,200
1943	7,476	15,933	17,000
1944	5,000	6,670 ^b	22,100

Notes: ^a Almost entirely from United States, as most Canadian production was retained in Canada for training or shipped to the Soviet Union.

^b First six months only. Part of British allocation from production in the United States was diverted to the American army in the latter part of year – H. Duncan Hall, *North American Supply* (London: HMSO, 1955), p. 416.

Sources: Central Statistical Office, *Statistical Digest of the War*, p. 148, for British figures, including overseas supplies; Overly, *Why the Allies Won*, p. 322, for German figures.

1941 the German army had a total of 208 divisions, of which 167 were full strength.⁵⁷ Very roughly, one would expect German output of tanks to be three times British output, if the German army were to be as mechanised as the British, but this ratio occurred only in 1944. Indeed, from 1941 to 1943 the total number of tanks supplied to the British army from American and United Kingdom sources exceeded total German production. Whatever may have been the problems with the quality of tanks available to the British army, there was no lack of quantity.

The issue of quality is one of the themes of Barnett's controversial study of Britain's war-time industrial performance, *The Audit of War*, in which he compares Britain very unfavourably with Germany and the United States in the design, development and production of tanks and aircraft.⁵⁸ As the review of weapons in previous sections shows, there were serious problems of quality with British tanks, and most of Barnett's criticisms are justified, although he underestimates the problems faced by companies that were expected by the War Office and the Ministry of Supply to be able to switch from manufacturing motor vehicles or steam locomotives to designing and developing armoured fighting vehicles. The successful design of the Cromwell and Comet tanks, by the Birmingham Railway Carriage and Wagon Company and Leyland Motors Ltd respectively, in the latter part of the war suggests

⁵⁷ R. A. C. Parker, *Struggle for Survival: The History of the Second World War* (Oxford University Press, 1989), pp. 28, 67.

⁵⁸ Barnett, *Audit of War*, pp. 143–58, 161–4.

movement along a learning curve. Production of the Cromwell provided a striking example of opportunity cost when allocating plant and labour. The Cromwell Mark III used a 600 h.p. Meteor aero-type engine and output was governed by the number that the Ministry of Aircraft Production was willing to make available to the Ministry of Supply. Consequently, Liberty engines of 375 h.p., which happened to be available, were used for a Mark II Cromwell that was slower than the Mark III.⁵⁹

In the case of aircraft, Barnett makes the British performance seem worse than it was by using selective comparisons. For example, he lists six unsuccessful British types of aircraft: the Sabre-powered Hawker Typhoon and Tempest, and the Westland Welkin fighter, the Bristol Buckingham medium bomber and the Vickers Windsor and Warwick heavy bombers. On the other hand, he mentions only two German failures, the Heinkel He 177 heavy bomber and the Junkers Ju 288 medium bomber, without commenting on the fact that the failure of the Heinkel machine deprived Germany of the means of conducting strategic bombing.⁶⁰ There were other unsuccessful German designs. Focke-Wulf attempted to develop an all-wood fighter, the Ta 154, with a view to conserving steel and light alloys, and as an answer to the British Mosquito; however, production had to be abandoned, owing to problems in procuring suitable wood glue and in arranging satisfactory sub-contracting of wooden components.⁶¹ Other spectacular failures included Messerschmitt's attempt to develop a replacement for its Bf 110 twin-engined fighter, the Me 210, which was abandoned on account of its poor flying characteristics after 554 had been completed or were in various stages of construction, and the Me 410, production of which was ended within two years of it entering service on account of its vulnerability to American fighters. The Arado Ar 240, which was to have had night-fighter, high-speed bomber and reconnaissance versions, was abandoned because of its flying characteristics and teething problems after a handful of the reconnaissance version had been produced. The Heinkel He 162, which Barnett describes as one of the first jet aircraft in service, was issued to squadrons in 1945 but pilots were instructed to avoid combat pending completion of trials and it never saw

⁵⁹ Lord Weir to Minister of Supply, n.d. but autumn 1942, Weir Papers 21/2, Churchill College, Cambridge.

⁶⁰ Barnett, *Audit of War*, p. 147. For the problems with the British aircraft mentioned, see Postan, Hay and Scott, *Design and Development*, pp. 126–32, who point out that the Welkin was not a complete failure (it did not go into service because the threat it was intended to meet, sub-stratosphere bomber attacks, did not materialise), and the Buckingham was similar in performance to its American contemporary, the Douglas Invader, and suffered in comparison with its British contemporary, the Mosquito.

⁶¹ Green, *Warplanes of the Third Reich*, pp. 241–5.

action.⁶² It is in the nature of developing advanced aircraft that not all will succeed, and on balance the British aircraft industry does not seem to have been more prone to failure than the German.

Sir Alec Cairncross, having compared the British and German aircraft industries, concluded that German firms had more skilled staff and superior development facilities, but the planning of aircraft production was certainly no better in Germany and in some respects, for example gaps in production runs, a good deal worse. The British practice of continuing production of obsolescent types was not entirely wasteful, since use could be made of them as glider-tugs or trainers, for example. Neither Britain nor Germany, Cairncross thought, could compare with the United States as regards boldness in planning, speed of execution, or productivity.⁶³ Edgerton has pointed out that the American aircraft industry's superior productivity reflected longer production runs and that, while German productivity was higher than British in 1944, when the Germans had concentrated production on a limited range of aircraft, the reverse was almost certainly the case earlier in the war, when British output exceeded German output. Studies of the *Luftwaffe* have concluded that from the 1930s, and for much of the war, the Germans made sub-optimal use of their resources for aircraft production by failing to achieve a rational allocation of work to design teams, by setting unnecessarily high standards for manufacturing minor fittings, and by wasteful use of raw materials, especially aluminium.⁶⁴

The scale of British war production was related to strategy. From September 1939 to May 1940 some industrial capacity was reserved for exports to help to pay for essential imports in a three-year war. In May 1940 the danger of defeat was so pressing that Beaverbrook, the minister of aircraft production, claimed absolute priority over other calls on industry. In 1941 the shortage of tanks and anti-tank guns in the Western Desert became almost as much an emergency requirement as aircraft had been the year before, and Beaverbrook, transferred to the Ministry of Supply, once more tried to maximise production. Unfortunately, his reliance on hustle rather than planning, however appropriate for running a newspaper like the *Daily Express*, which he owned, could be disruptive when it came to supplying the needs of the air force

⁶² Ibid., pp. 58–62, 366–73, 610–14, 658–63.

⁶³ Alec Cairncross, *Planning in Wartime: Aircraft Production in Britain, Germany and the USA* (Basingstoke: Macmillan, 1991).

⁶⁴ Edgerton, 'Prophet militant', *Twentieth Century British History*, 2 (1991), 373–4; Edward L. Homze, *Arming the Luftwaffe: The Reich Air Ministry and the German Aircraft Industry 1919–39* (Lincoln: University of Nebraska Press, 1976), pp. 189–91, 212–16, 261–7; Williamson Murray, *Luftwaffe* (London: Allen and Unwin, 1985), pp. 93–9, 128–9.

and army. Targets set for aircraft production were too ambitious and had to be scaled down; improvisation replaced organisation, and the aircraft industry ceased to pay attention to instructions from the ministry, proceeding on the basis of doing the best they could, like self-employed tradesmen. It was not until after Beaverbrook had left the Ministry of Aircraft Production in May 1941 that planning could ensure that there was consistency in programmes for aircraft and components. Production did rise in 1940, but it was rising before Beaverbrook took over, and during 1941 bottlenecks sprang up, mainly on account of maldistribution of components and materials.⁶⁵ As for tank production, no amount of hustle could produce a quick solution to the problems of poor design and inexperienced manufacturers.

From March 1941, with the passing of the Lend-Lease Act, British war production could take increasing account of what could be better supplied from the United States. The falling off in British tank production after 1942 reflected the fact that it was no longer necessary for Britain to be self-sufficient; on the other hand, continued British production was a necessary insurance against a shortfall in American deliveries. Likewise the fact that British steel production peaked in 1942 and declined by 9.8 per cent by 1944 reflected the shipping shortage, which made it more sensible to import finished steel from the United States than to import more bulky iron ore.⁶⁶

As in the First World War, the key factor of production was labour. The introduction of conscription in April 1939 made it possible to register all workers and to prevent skilled labour and other reserved categories of men being recruited by the services, in contrast to what had happened in 1914–15. A ceiling of about 2 million was placed on the size of the army in 1941, to ensure that it did not drain manpower from munitions production. Under the Emergency Powers (Defence) Act of 22 May 1940, the minister of labour and national service could direct any person in the United Kingdom to perform any work in any place, and, although Bevin used his powers with moderation, labour was transferred to munitions work from firms producing consumer goods. From 1941 the Board of Trade had powers to close factories so as to concentrate production of the reduced volume of consumer goods in fewer firms and to release more labour for munitions work. To prevent munitions production being disrupted, Bevin took powers in July 1940 to refer disputes causing strikes or lockouts to compulsory arbitration.

⁶⁵ Cairncross, *Planning in Wartime*, pp. 7–8, 12–13; Postan, *British War Production*, pp. 116, 118, 124, 137–8; Ritchie, *Industry and Air Power*, pp. 229–30, 234–8.

⁶⁶ Central Statistical Office, *Statistical Digest of the War* (London: HMSO, 1951), p. 107.

To prevent disruption from poaching or turnover of labour, no worker could leave or be dismissed from any factory scheduled by the Ministry of Labour and National Service without the minister's consent after March 1941. Conscription of labour was introduced gradually by age, skill and gender, with conscription of women being delayed until the end of 1941, when Bevin felt that public opinion was ready for a measure that even Hitler did not impose on Germans.

These powers made it possible to allocate labour according to the needs of strategy. In May 1940 aircraft production was given the highest priority for new war workers, but this made for shortages in other programmes, besides reducing pressure on aircraft firms to adopt dilution. Consequently at the end of September 1940 the War Cabinet decided that labour must be allocated in proportion to all approved programmes. Manpower budgeting, together with allocation of materials and industrial capacity became the basis of planning the war economy.⁶⁷ However, manpower budgeting was not an exact science. The labour required to meet the services' requirements had to be estimated on the basis of past experience of production, tempered by the knowledge that man-hours employed in making, say, an aircraft would fall as firms moved along a learning curve in its production; and by a known tendency of firms and departments to overstate their needs. The final outcome of the manpower budget was decided by the Prime Minister, and therefore reflected his view of strategic priorities.⁶⁸

It was one thing to mobilise labour; quite another thing to ensure that it was used efficiently. Dilution, especially in engineering and shipbuilding, raised endless problems. Barnett, with some justification, is highly critical of the shipbuilding industry's reluctance to accept changes necessary to increase productivity even in the worst days of the Battle of the Atlantic.⁶⁹ The industry had responded to the inter-war depression by closing surplus capacity, but with only a very small rise in productivity in yards that remained open; indeed, output per man in the late 1930s was very little, if at all, above what it had been before the First World War.⁷⁰ Bevin's negotiations with the shipyard unions to secure the optimum use of scarce skilled labour during the war ran up against distrust that dilution would lower wages and create unemployment once

⁶⁷ Bullock, *Life and Times of Ernest Bevin*, vol. II, chs. 1–6; Hancock and Gowing, *British War Economy*, chs. 11 and 15; P. Inman, *Labour in the Munitions Industries* (London: HMSO, 1957), chs. 7–8.

⁶⁸ Wilson, *Churchill and the Prof*, pp. 104–11. ⁶⁹ Barnett, *Audit of War*, ch. 6.

⁷⁰ J. R. Parkinson, 'Shipbuilding', in Neil Buxton and Derek Aldcroft (eds.), *British Industry between the Wars: Instability and Industrial Development 1919–1939* (London: Scolar Press, 1979), pp. 79–102, at p. 87.

Table 4.4. *Numbers of days lost in strikes and lockouts in all industries and services, and the percentage of these that were in coal-mining, 1914–18 and 1939–45*

	('000)	(%)		('000)	(%)
1914	9,878	37.6	1939	1,356	41.7
1915	2,953	55.6	1940	940	53.7
1916	2,446	12.7	1941	1,079	31.0
1917	5,647	20.7	1942	1,527	55.0
1918	5,875	19.8	1943	1,808	49.2
			1944	3,714	66.8
			1945	2,835	22.6

Source: Source: Department of Employment and Productivity, *British Labour Statistics: Historical Abstract 1886–1968* (London: HMSO, 1971), p. 396.

peace returned. Even when he had the support of a national trade union, he might be defied by its members at shipyard level. For example, the fitters at Newport, in South Wales, insisted throughout the war on working in pairs, as was their custom, although in every other yard in the country a fitter would work with a semi-skilled mate.⁷¹ Matters were worse in coal-mining, where output actually fell during the war, partly on account of miners being allowed to move out of the industry in 1940, when export markets in Western Europe were lost, but also because of the inheritance from the inter-war depression of an ageing and disaffected workforce.⁷² Coal lost more days of work on account of strikes than any other industry. In industry as a whole strikes were more frequent than they had been in the First World War, but they tended to be resolved quickly, so that the average annual loss of working days in 1939–45 was about half that of 1914–18. As in the First World War, industrial relations deteriorated the longer the war went on (see table 4.4); hence a series of white papers in 1944 aimed at maintaining morale by promises of universal social insurance, a national health service, and high and stable employment after the war.⁷³

One group of producers who fared well during the war were farmers, whose share of national income rose from 1.2 per cent in 1938–9 to 2.4 per cent in 1944–5. Agriculture had been depressed before the war and the rapid increase in farmers' incomes helped to finance the increase in output necessary if the government's target of a 25 per cent reduction in food imports was to be achieved. In fact the eventual reduction was 55 per cent.

⁷¹ Bullock, *Life and Times of Ernest Bevin*, vol. II, pp. 61–2.

⁷² W. H. B. Court, *Coal* (London: HMSO, 1951).

⁷³ Paul Addison, *The Road to 1945: British Politics and the Second World War* (London: Jonathan Cape, 1975), pp. 215–25, 240–8.

To save shipping space, the Ministry of Agriculture directed farmers to concentrate on the production of grain, and guaranteed markets and prices. Agriculture showed that the profit motive and state direction could be successfully combined to create a more efficient sector.⁷⁴

On the other hand, it was realised that profits in industry might undermine support for the war effort from trade unions or the wider public. The September 1939 budget introduced an excess profits tax (EPT) levied at 60 per cent of profits in excess of a standard based on pre-1938 profits. The Treasury was aware that raising EPT to 100 per cent would remove all financial incentive from businessmen to make more efficient use of resources or to take risks with new investment, since any profit arising from reducing costs would be taken away. Nevertheless, it was necessary to offset the Emergency Powers (Defence) Act of May 1940, with its controls over labour, with a declaration that there would be no profit from the national emergency, and EPT was raised to 100 per cent. The 1941 budget restored some incentive to make more efficient use of capital by promising that 20 per cent of EPT paid during the war would be repaid afterwards, provided that the refund was ploughed back into a business.⁷⁵ Even so, there was a strong incentive for businessmen to negotiate contracts that would cover their costs plus a standard profit, and to be content with managing government factories rather than take risks. Cost-plus was not a good basis for increasing productivity of labour or plant, making it all the more important to try to increase productivity through contract procedures that allowed for technical costing by government agents. The view of the official historian of contracts and finance is that the system worked in war-time.⁷⁶ However, a cost-plus mentality may have taken root in firms in the aircraft and other industries that would make them less competitive in peace.

As in the First World War, the Treasury saw the purpose of war finance as the adjustment of production and consumption so as to maintain essential supplies for the civil population, while securing the largest possible proportion of national income for the government. In 1939 the Treasury thought that at least one-half of national income should be made available for government needs.⁷⁷ Table 4.5 shows that

⁷⁴ Keith A. H. Murray, *Agriculture* (London: HMSO, 1955), pp. 241, 290, 340, 374–5, 378–9.

⁷⁵ Peden, *Treasury and British Public Policy*, pp. 319, 321, 324.

⁷⁶ William Ashworth, *Contracts and Finance* (London: HMSO, 1953), esp. p. 242.

⁷⁷ Sir Richard Hopkins, 'Draft statement on war finance for the National Joint Advisory Council on 6th December 1939', T 175/117, TNA.

Table 4.5. *Percentage shares of national income (NNP), 1938–45*

	Government military expenditure	Government civil expenditure	Consumer expenditure	Net non-war capital formation
1938	7	10	78	5
1939	15	9.5	73.5	2
1940	44	8	64	–16
1941	54	7	56	–17
1942	52	8	52	–12
1943	56	7	49	–12
1944	54	7	51	–12
1945	49	7	54	–10

Source: Sidney Pollard, *The Development of the British Economy 1914–1990* (London: Edward Arnold, 1992), p. 174. © Edward Arnold (Publishers) Ltd.

this target was achieved, partly by a drastic reduction in the consumer's share of output, and partly by disinvestment: firms' depreciation funds were diverted to government loans; plant for civilian use was not replaced; and railways and roads were allowed to deteriorate. However, whereas most of the reduction in the consumer's share of output in the First World War had been brought about by inflation caused by government borrowing (and inflation had fuelled industrial discontent over wages, causing strikes and disrupting production), financial policy in the Second World War reduced inflation to a minimum. High taxes on income reduced consumers' spending power, while price controls and rationing ensured that essential goods remained affordable and available. 'Luxuries', including alcohol and tobacco, which had little or no weight in the Edwardian working-class cost-of-living index that was still in use, were taxed heavily to reduce the spending power of people not affected by income tax. Keynes used national income analysis to advise the chancellor on how much should be raised from taxation and savings. However, the disincentive effect of high rates meant that income tax could not be raised further after the 1941 budget, when the standard rate reached 10s (50p) and the top marginal rate of income tax plus surtax, paid by the very rich, was 19s 6d (97.5p). The introduction of pay-as-you-earn (PAYE) made it possible to tax working-class wage-earners in a way that had not been possible in the First World War, and the policy of stabilising the cost-of-living index encouraged some moderation on the part of trade unions in their demands for higher wages.⁷⁸

⁷⁸ Peden, *Treasury and British Public Policy*, pp. 320–7.

It is difficult to see how much more could have been done to divert spending power to the government. Certainly Churchill, advised by Lindemann, believed that the maximum tolerable limit of mobilisation had been reached by the latter part of 1942.⁷⁹ International comparisons by Harrison show that Germany and the Soviet Union, and even the United States from 1943, mobilised higher proportions of domestic resources for the war than Britain. However, the totalitarian states could adopt methods that no free society would accept, and Germany was able to conscript labour throughout occupied Europe. The sacrifices made by the American population were less than those by the British because the United States could increase its national income by mobilising resources still unemployed or underemployed from the depression. In 1943 Britain mobilised a higher proportion of her labour force for war production and the armed forces than the United States, and more for war production and almost as much for the armed forces as Germany.⁸⁰ Altogether Britain sacrificed the equivalent of 18.6 per cent of her pre-war wealth between 1939 and 1945, the largest element being external disinvestment.⁸¹

Such mobilisation was possible because sea power enabled Britain to take full advantage of an international division of labour in the world economy, importing food, raw materials and munitions. British strategy always relied upon being able to mobilise overseas resources, but the sources of external finance varied over time. There were four ways in which Britain could finance purchases abroad. First, she could earn foreign exchange by exporting goods and services, but it was inevitable that earnings would cover a declining proportion of purchases as Britain mobilised her industry for war production. Second, she could use her gold reserves which, notwithstanding the decline in 1938–9, were still greater than in 1914, but were small in relation to the purchases that would be made in a long war. Third, the government could take over British-owned foreign securities, and obtain foreign exchange via the dividends, or by selling the securities, or by using them as collateral for loans, but Britain had already reduced her stock of foreign securities in the First World War. Finally, she could borrow, either by persuading countries to accumulate sterling in London, typically by holding Treasury bills, or by raising loans outside the sterling area; however,

⁷⁹ Wilson, *Churchill and the Prof*, pp. 97–8.

⁸⁰ Mark Harrison, 'Resource mobilization for World War II: the USA, UK, USSR, and Germany, 1938–1945', *Economic History Review*, 41 (1988), 171–92, at 184 and 186; Hancock and Gowing, *British War Economy*, p. 371.

⁸¹ Stephen Broadberry and Peter Howlett, 'The United Kingdom: "victory at all costs"', in Harrison (ed.), *Economics of World War II*, pp. 43–80, at p. 69.

under the Johnson Act, she could not borrow in the United States, by far the most important overseas source of munitions.

The accumulation of sterling balances in London represented transactions that were not by any means restricted to supply of goods for the British war economy. Most of India's sterling balances were the result of an agreement between the chancellor of the exchequer and the secretary of state for India in February 1940 whereby the British Treasury would pay the whole of the extra cost of Indian forces (compared with peacetime) while they were serving abroad, plus the cost of military stores supplied by India to British forces in the Middle East. The cost of maintaining India's forces rose rapidly after the entry of Japan into the war, and India's sterling balances increased from £295 million in mid-1942 to £1,138 million in mid-1945, and a further £300 million was transferred from the United Kingdom to India by the sale of securities held by UK residents. Middle Eastern countries also accumulated sterling balances through the supply of goods and services to British forces. As regards food and raw materials for the United Kingdom, the important parts of the sterling area were Australia, New Zealand and the African colonies. Munitions and machine tools for British production of munitions had to be sought outside the sterling area, North America being the only practical source of supply, besides also being a more economical source of food and raw materials than Australasia from a shipping point of view. Canada's economy was closely linked to that of the United States, and before the war she had financed a deficit in her balance of payments with her southern neighbour by a surplus in her balance of payments with Britain. Consequently, Canadian supplies had to be paid for partly in gold and American dollars, to cover the Canadian deficit. Canada, not being a member of the sterling area, was less willing than other dominions to allow Britain an unlimited overdraft, and British purchases were paid for partly by the sale of Canadian securities held by UK residents.⁸²

The biggest problem, however, was financing British purchases in the United States on the cash and carry basis that prevailed in 1939–41: Britain's gold and dollar reserves fell from £519 million in September 1939 to £108 million by the end of 1940; and American securities owned by British residents were requisitioned and sold as fast, and perhaps faster, than the New York stock market could absorb them.⁸³ Initially the intention had been to spin out the reserves over a three-year war and purchases of American munitions were limited as tightly as possible, so as to allow scarce dollars to be spent on machine tools and

⁸² Sayers, *Financial Policy*, chs. 9–12. ⁸³ *Ibid.*, pp. 369–70, 496.

raw materials for munitions production in Britain. On 30 January 1940 Britain's total requirements in the United States for the first twelve months of the war were estimated at £197 million, of which aircraft accounted for 11.7 per cent and other munitions 6.1 per cent, whereas machine tools accounted for 21.8 per cent and cotton 13.2 per cent. Britain was also heavily dependent on American petroleum, which accounted for another 15.2 per cent of projected dollar expenditure in 1939–40.⁸⁴ Faced with imminent defeat in the summer of 1940, British purchasing policy changed drastically and dollars were spent freely. The ending of financial caution was encouraged by signs that American opinion was shifting in favour of the Allies and that it was almost certain that credit would eventually be made available. French contracts were taken over after France asked for an armistice. In July 1940, at a time when American firms were producing about 250 aircraft a month for British contracts, with a projected peak of 700 a month, it was agreed to place orders for an additional 3,000 a month from January 1941. This enormous increase was beyond the current capacity of the American aircraft industry, but British orders encouraged an expansion of capacity that was to serve the United States well when it entered the war. The loss of army equipment at Dunkirk made orders for tanks and anti-tank guns, field artillery, anti-aircraft guns and small arms a matter of urgency. However, the Ministry of Supply was more cautious than Beaverbrook's Ministry of Aircraft Production and the scale of orders, although vast, was sufficiently limited to ensure that the supply of machine tools and raw materials required for production in Britain would not be diverted to American firms.⁸⁵

The immediate supply of aircraft and munitions available in the United States was at first of limited value both in terms of quality and quantity. It was not until 1941 that the Americans had fighters in production that were comparable to British or German fighters of 1939 vintage.⁸⁶ The 150 Brewster Buffalos that were delivered to the RAF in 1940 were rejected for European operations and sent to the Far East, as were Curtiss Hawks delivered as part of the residue of French contracts. From 1941 American fighters served in the Middle East, in the ground attack role, but the Merlin-powered P-51 Mustang, which was more than a match for German fighters, was not delivered to the RAF until 1944. The quality of American bombers was at least equal to European standards, but they were available only in small numbers until 1943 and

⁸⁴ Hancock and Gowing, *British War Economy*, p. 106.

⁸⁵ R. Duncan Hall, *North American Supply* (London: HMSO, 1955), pp. 146–53, 158–77.

⁸⁶ Craven and Cate (eds.), *Army Air Forces*, vol. VI, esp. pp. 211–15, 218–19.

did not conform to Bomber Command's view of what was required for the strategic air offensive against Germany. Most were employed in the Middle or Far East, or by Coastal Command. Although \$120 million were allocated in July 1940 to the purchase of 2,000 medium tanks in America, the only machines available for early delivery were light tanks and, as noted above, the first American medium tanks did not reach Egypt until May 1942.⁸⁷

As had been anticipated in June 1940, President Roosevelt found a way round the Johnson Act once the US Treasury and American public opinion were satisfied that Britain no longer had the means to pay dollars for her purchases. On 17 December 1940 he came up with the idea of Lend-Lease, whereby munitions, raw materials and even food would be handed over to Britain, if the President decided that they would thereby best be employed for the defence of the United States. It was not in America's interests that Britain should be defeated by Germany. Equally, however, the Roosevelt administration was not averse to pursuing American interests by securing concessions from Britain. The US Treasury was suspicious of the way in which the sterling area operated to Britain's advantage in international trade, and the US State Department hoped to press Britain into abandoning imperial preference. Under the Lend-Lease Act of March 1941 Britain had to provide the United States with 'direct or indirect' benefits in return for supplies, and in subsequent negotiations Britain was pressed to agree not to discriminate against American exports. Churchill secured a statement from Roosevelt that the Americans did not require a commitment to the abolition of imperial preference in advance of the signing of the Mutual Aid Agreement of 1942, but under the agreement both countries committed themselves to work for the elimination of all discrimination in international trade. Meanwhile, Britain had had to state in September 1941 that it would not export any goods that embodied materials supplied under Lend-Lease, thereby making it easier for American firms to take over British markets. The Secretary of the US Treasury, Henry Morgenthau, ensured that Britain would continue to be financially dependent by limiting any rise in Britain's gold and dollar reserves. In June 1941 Britain's gold reserves had reached a low of £65 million. By the end of 1942, however, as a result of expenditure by American forces in Britain and in the sterling area, the reserves stood at £254 million. Thereafter, the US Treasury checked the rise in the reserves by reducing the range of food and raw materials covered by

⁸⁷ Hall, *North American Supply*, p. 175.

Lend-Lease.⁸⁸ The price of Churchill's policy of victory at any cost was a weakening of British power, through the accumulation of sterling balances and the loss of overseas assets and markets, and consequent dependence upon the United States.

Grand strategy: the period of the Anglo-French alliance

Anglo-French war plans prior to September 1939 had been based on the assumption that blockade would be as potent a weapon as it had seemed to be in 1916–18. It was expected, therefore, that the Germans would seek an early victory before blockade could wear them down. British and French planners thought in terms of a long war, in which they would follow a defensive strategy in the opening phase, gaining time in which to mobilise their superior resources, including those of their empires, and moving to an offensive strategy only when the balance of power had shifted decisively in their favour. The RAF intended to bomb the enemy's manufacturing resources as part of the wearing-down process. The British expected the Germans to attack the United Kingdom and its trade routes by air and sea, as well as France by land, and notwithstanding the commitment made early in 1939 to send the BEF to France, most of the RAF would remain in the United Kingdom. The *Luftwaffe* was expected to inflict heavy civilian casualties with high-explosive bombs and to use gas to terrorise the population.⁸⁹ Churchill was concerned as late as July 1941 that there should be no shortfall in British production of gas.⁹⁰ In the event, neither side used gas against cities.

Too much was expected of the blockade, no doubt because the Germans had been inclined to exaggerate its effectiveness in the First World War. The Nazi–Soviet Pact on 23 August 1939, and more particularly the Soviet–German trade agreement of 11 February 1940, raised the issue of how effective sea power alone could be in preventing

⁸⁸ Alan P. Dobson, *US Wartime Aid to Britain, 1940–1946* (London: Croom Helm, 1986); Sayers, *Financial Policy*, chs. 13–15, and p. 496.

⁸⁹ Chiefs of Staff, 'Planning for war with Germany', DP (P) 2, 15 Feb. 1937, CAB 16/182, and 'European appreciation, 1939–40', DP (P) 44, 20 Feb. 1939, CAB 16/183, TNA are the key British documents. For French strategy and its influence on British thinking before the war, see Robert Young, '“La Guerre de longue durée”: some reflections on French strategy and diplomacy', in Adrian Preston (ed.), *General Staffs and Diplomacy before the Second World War* (London: Croom Helm, 1978), pp. 41–64, and Talbot C. Imlay, *Facing the Second World War: Strategy, Politics, and Economics in Britain and France 1938–1940* (Oxford University Press, 2003), pp. 17–20, 27–33, 42–50, 84–106. For the scale of expected air raid casualties in Britain being far in excess of what actually occurred, see O'Brien, *Civil Defence*, pp. 96, 392–3, 677–9.

⁹⁰ *The Churchill War Papers*, ed. Martin Gilbert, 3 vols. (London: Heinemann, 1993–2000), vol. III, p. 954.

the Germans gaining access to raw materials. At first the British Ministry of Economic Warfare did not believe that the Soviet Union's normal exportable surplus would be of major assistance to Germany, but by March 1940 it was warning the Cabinet that the effect of the blockade might be largely nullified by Soviet supplies.⁹¹ A fundamental problem with Allied strategy during the first seven or eight months of the war was the lack of military activity to make the Germans use up stocks of strategic materials. The RAF refrained from strategic bombing, nominally in response to an appeal to the combatants by President Roosevelt, but in reality because of the need for more time in which to prepare, and the French army remained inactive behind the Maginot Line. Germany was able to import Swedish iron ore and to bring sufficient political pressure on Romania to ensure that the latter continued to export oil to her, despite Allied attempts at pre-emptive purchase.⁹²

The Allies' strategic position, therefore, was by no means as favourable for the conduct of a long war as pre-war planners had hoped. On the plus side, the Allied navies were able to prevent German surface raiders doing much damage to trade. The German pocket battleship *Deutschland* was recalled from the North Atlantic in November 1939 after sinking only two merchant ships, and its sister ship, the *Graf Spee*, was scuttled on 17 December after an unsuccessful engagement with three British cruisers, having accounted for nine merchant ships.⁹³ The threat from submarines was also contained, mainly on account of the small number of U-boats available in the winter of 1939–40, and the defective torpedoes with which they were armed.⁹⁴ The new German magnetic mine accounted for more merchant ships than the U-boats in the last two months of 1939, but by the end of March 1940 the Royal Navy had developed effective countermeasures.⁹⁵ The sinking by a U-boat of the battleship *Royal Oak* at Scapa Flow on 14 October 1939, and the threat of air attacks, forced the Home Fleet to leave its main base until adequate defences were in place in March. Nevertheless, the Allies enjoyed the benefits of command of the sea. A BEF of 158,000 men had been safely transported to France by 11 October, and the delay in active operations on the Western Front gave a much needed breathing space in which to make up deficiencies in equipment and training.

⁹¹ W. N. Medlicott, *The Economic Blockade*, 2 vols. (London: HMSO, 1952–9), vol. I, pp. 312–13, 315–26, 403–5; Imlay, *Facing the Second World War*, pp. 122–3.

⁹² Medlicott, *Economic Blockade*, vol. I, pp. 141–8, 250–9.

⁹³ Roskill, *War at Sea*, vol. I, pp. 112–21.

⁹⁴ Bennett and Bennett, *Hitler's Admirals*, pp. 61–2.

⁹⁵ Roskill, *War at Sea*, vol. I, pp. 99–102, 106, 126–8.

Even so, there was growing unease, particularly in France, that time might not be on the Allies' side. French intelligence assessments exaggerated the rate at which Germany was expanding her army and air force, and French munitions production was behind schedule, particularly as regards aircraft. The more France turned to American firms to make up the shortfall, the less likely it was that her gold and dollar reserves would be sufficient for a long war. French planners seem to have been more pessimistic than the British Ministry of Economic Warfare about the effectiveness of blockade. French intelligence believed that the Soviet Union and Germany were working together as allies, and accordingly the Soviet Union tended to be viewed in Paris as a potential if not actual enemy. These ideas reached British military planners through the joint Allied Military Council, and by March there were doubts on both sides of the Channel about the long-war strategy.⁹⁶

It is against this background that one can begin to understand how plans came to be made that would have involved hostilities with the Soviet Union. As early as January 1940 the French were preparing staff studies of how Soviet oil production could be disrupted, and by March the *Armée de l'Air* had a draft plan for bombers based in Syria to attack Baku and other targets in the Caucasus, where 90 per cent of the Soviet oil industry was situated. Paul Reynaud, who became the French premier on 21 March, pressed the British at the Supreme War Council later that month to give the project their support. Chamberlain, however, confident that German and Soviet interests were fundamentally incompatible, believed that the costs of a war with the Soviet Union would outweigh the potential benefits and a decision was deferred.⁹⁷

The Soviet invasion of Finland on 30 November 1939 also led to plans that might lead to a wider conflict. At the Supreme War Council on 19 December the French premier, Edouard Daladier, advocated sending an Allied expeditionary force to Finland via Narvik, both to assist the Finns and to counter German and Soviet designs in Scandinavia.⁹⁸ The War Office began to explore the possibility of sending supplies and troops across Norway and Sweden, using Narvik as a base. Churchill, as first lord of the Admiralty, had since September unsuccessfully advocated laying mines in Norwegian waters to prevent the Germans importing Swedish iron ore through Narvik during the winter months, when Swedish ports on the Gulf of Bothnia were blocked by ice. He was quick to see that, once established at Narvik, the

⁹⁶ Imlay, *Facing the Second World War*, pp. 54–6, 58–63, 109–15.

⁹⁷ *Ibid.*, pp. 70–3, 123–5.

⁹⁸ Patrick R. Osborn, *Operation Pike: Britain versus the Soviet Union, 1939–1941* (Westport, Conn.: Greenwood Press, 2000), pp. 41–2.

Allies could cut off the Germans' imports of iron ore even more effectively than by purely naval action. He was aware that Germany might invade Scandinavia, but claimed in a Cabinet paper on 16 December that the Allies had 'more to gain than lose by a German attack upon Norway or Sweden'.⁹⁹ On 2 January 1940 the Chiefs of Staff warned the War Cabinet against what the CIGS, Sir Edmund Ironside, privately called 'this half-cock scheme', on which he commented prophetically: 'It is the Dardanelles over again.'¹⁰⁰ Halifax, the foreign secretary, feared a hostile reaction in the United States to any breach of Norwegian neutrality. The War Cabinet hesitated, and it was not until after the Finns had signed an armistice on 13 March that it agreed that the mine-laying operation should go ahead.¹⁰¹ It was anticipated that the Germans might react by invading Norway, and troops were embarked on cruisers in the Forth and Clyde ready to sail to Bergen, Stavanger, Trondheim and Narvik.

There is not room in a book of this nature to do justice to the blunders that led to the Allied defeat in Norway. Two factors stand out: first, a marked tendency on Churchill's part to improvise rather than to have a clear and consistent strategy; second, the importance of air power. By the evening of 6 April the Admiralty knew that there were large-scale shipping movements in German waters, even before the first British minefields were due to be laid around Narvik early on 8 April. Nevertheless, Churchill's reaction on hearing that German warships were at sea was to prepare for a purely naval encounter, and on his instructions the troops aboard the cruisers in the Forth and Clyde were disembarked on 8 April, to allow the cruisers to join the Home Fleet. As a result, when the Germans landed in Norway on 9 April, the British reaction was too slow to secure the ports there. There was a further muddle when Churchill, as chairman of the Cabinet's Military Co-ordination Committee, ordered half of a convoy which was carrying an infantry brigade to attack Narvik to be diverted to Namsos on 14 April, as part of an unsuccessful attempt to take Trondheim.¹⁰² The Royal Navy did inflict losses on the German navy, particularly at Narvik, where ten German destroyers were sunk in two engagements on 10 and 13 April, but it was unable to prevent the flow of German reinforcements across the Skagerrak because of the danger of air attack.

⁹⁹ Churchill, *Second World War*, vol. I, pp. 480–92, at p. 492.

¹⁰⁰ *Ironside Diaries*, pp. 191–2.

¹⁰¹ Cabinet conclusions, 23 Feb. 1940, CAB 65/5, TNA.

¹⁰² Reynolds, *In Command of History*, p. 123; Roskill, *War at Sea*, vol. I, pp. 157–62; *Ironside Diaries*, pp. 255–65.

The *Luftwaffe* dominated the skies over Norway because the RAF's fighters lacked the range to intervene from Britain. A squadron of fighters was transported to central Norway by aircraft carrier but was unable to sustain itself at its improvised base on a frozen lake against attacks by German bombers. The Germans had made Norwegian airfields their first objective, seizing them with airborne troops and supplying them by air. From that point the Royal Navy was at a disadvantage. As Admiral Sir Charles Forbes, the commander of the Home Fleet admitted, 'the scale of air attack that would be developed against our military forces on shore and our naval forces off the Norwegian coast was grievously underestimated when the operations were undertaken'.¹⁰³ The Allies' only success on land was the capture of Narvik on 28 May, but it was evacuated shortly afterwards because the troops were needed in France, where the situation following the main German offensive in the West was critical.

The German attack on Holland and Belgium on 10 May had long been foreseen and the French army and the BEF advanced to take up defensive positions east of Brussels. If the Belgian and Dutch armies, with 22 and 8 divisions respectively, are added to the 10 British and 104 French divisions between the North Sea and Switzerland, there was almost exact equality with the 136 German divisions deployed in the West on that date. The French and Germans each had about 2,500 tanks (excluding obsolete French light tanks); the British initially had only one tank brigade with 100 infantry tanks, but an armoured division with 143 cruiser and 114 light tanks arrived during the fighting. The Germans enjoyed superiority in the air, using 2,741 combat aircraft in the campaign against 1,046 French, 416 RAF and about 400 Belgian and Dutch aircraft, but even that advantage was a result of British strategy, which gave priority to the air defence of Great Britain and reserved most of Bomber Command for strategic bombing. Had the greater part of the RAF been employed in France, as in 1918, the Allies would have matched the Germans as closely in the air as on land.¹⁰⁴

A number of factors contributed to the Allied defeat. German dive bombers acted as mobile artillery, and the concentrated mass of panzer divisions overwhelmed the widely dispersed French tanks and advanced to the Channel, cutting the Allied armies in two. The British Tank

¹⁰³ Roskill, *War at Sea*, vol. I, p. 179.

¹⁰⁴ Lionel Ellis, *The War in France and Flanders 1939–1940* (London: HMSO, 1953), p. 254; *Germany and the Second World War*, 6 vols. (Oxford: Clarendon Press, 1990–2001), vol. II: Klaus A. Maier, Horst Rohde, Bernd Stegemann and Hans Umbreit, *Germany's Initial Conquests in Europe* (1991), p. 279; Overy, *Air Power*; R. H. S. Stolfi, 'Equipment for victory in France in 1940', *History*, 55 (1970), 1–20.

Brigade achieved some success at Arras on 21 May but the Allies failed to close the gap; on 26 May the BEF was ordered to fight its way to the coast. Two days later the exhausted Belgian army surrendered. Most of the BEF and many French troops were evacuated through Dunkirk by 4 June, but all their heavy equipment was lost. After the campaign the BEF was able to claim that, although it had been deficient in equipment, its line had never been broken by frontal attacks, and that its retreats had been made in order to conform to those of its allies.¹⁰⁵ Even if the 1st Armoured Division had been available earlier, it could not have stopped the nine panzer divisions employed in the German drive to the coast. Only by a radically different policy of preparing armoured divisions in preference to infantry divisions could the British army have made much difference to the outcome of the campaign. However, armoured divisions could not have fulfilled the inter-war army's everyday role of colonial policing and, in any case, as noted in chapter 3 (see pp. 124–5, 157), muddle in preparing tank designs delayed the completion even of two such formations.

British air strategy and doctrine contributed to the debacle. The War Office had been impressed by German use of air power in close support of ground forces in the Polish campaign, and wanted to create a tactical air force under army command, but the Air Ministry was determined to retain control of all bombers. Sixteen squadrons were earmarked to support the army, but Bomber Command maintained that the proper role of its main force was to attack the Ruhr, in a long-term strategy to disable German industry by attacking oil and power plants. Fewer fighter squadrons were sent to France than the French wanted, and the squadrons that were sent lacked the road transport necessary to cope with a fast-moving land campaign. Home-based squadrons had sufficient range to cover Dunkirk, but not further inland. The *Armée de l'Air* was undergoing a re-equipment programme, so that its pilots tended to have either obsolescent or unfamiliar aircraft. Even so, the *Luftwaffe* suffered casualties in May that were on the same scale as in August and September, during the Battle of Britain, suggesting that German control of the air over Belgium and northern France was not inevitable, if the Allies had made better use of their forces.¹⁰⁶

¹⁰⁵ 'Committee to review the lessons learned from the recent fighting in Flanders (Bartholomew Committee) Report, 1940', WO 32/9581, TNA; Lord Gort's despatches, *London Gazette*, no. 35305, 17 Oct. 1941.

¹⁰⁶ J. R. M. Butler, *Grand Strategy*, vol. II (London: HMSO, 1957), pp. 154–6; Ellis, *War in France*, pp. 24–9; William Green, 'Who lost the battle for France?', *RAF Flying Review*, 15 (June 1960), 21–4; Murray, *Luftwaffe*, p. 45; Overy, *Air Power*; Webster and Frankland, *Strategic Air Offensive*, vol. I, pp. 125–43.

The British government faced difficult strategic and political choices in the immediate aftermath of Dunkirk. French pleas for more aircraft were rejected, in order to conserve Fighter Command for the direct defence of the United Kingdom. It was harder to refuse to send troops, since Churchill was aware that nine-tenths of the fighting on the ground had been done by the French, and the gesture of sending a new BEF might encourage them to continue the struggle. The only two formed divisions available in June were sent, and in due course lost their equipment when they were evacuated after the French request for an armistice.¹⁰⁷

Grand strategy: the Empire at bay, June 1940–July 1942

The immediate problem facing the War Cabinet and the Chiefs of Staff in June 1940 was the defence of the United Kingdom and its trade routes. In the longer term, there were the questions of whether and how the war could be won. Churchill placed his hopes in ‘immense American supplies’ becoming available, and even in Roosevelt bringing the United States into the war once the presidential election in November was over.¹⁰⁸ By September a new strategy was in place for a long war, on the assumption that American support would eventually be forthcoming. Meanwhile a German invasion had to be averted.

The role of Fighter Command in the defence of the United Kingdom in 1940 is well known. Less familiar are the roles of the army, navy and Bomber Command. Although the army lacked artillery, tanks and transport after its losses in France, it was still sufficiently strong numerically, thanks to the evacuation from Dunkirk, to impose on the Germans the necessity of mounting a full-scale invasion over several days, rather than a *coup de main*. The German navy had sustained losses and damage during the Norwegian campaign, severely limiting its ability to protect the large number of ships, tugs, river barges and other improvised craft required to transport the first wave of nine divisions. For the invasion to succeed the *Luftwaffe* had to neutralise the Royal Navy, and to do that it had first to establish air superiority over the Channel. Bomber Command added to the Germans’ difficulties by attacking concentrations of invasion craft in French and Belgian ports.¹⁰⁹

¹⁰⁷ Churchill, *Second World War*, vol. II, pp. 116–17, 123–30, 137–9, 189.

¹⁰⁸ Ibid., pp. 152, 174; John Colville, *The Fringes of Power: Downing Street Diaries, 1939–55* (London: Hodder and Stoughton, 1985), p. 283.

¹⁰⁹ Bennett and Bennett, *Hitler’s Admirals*, pp. 78–86; Basil Collier, *The Defence of the United Kingdom* (London: HMSO, 1957), pp. 123–5, 127, 137–8, 175–82, 225–7; Roskill, *War at Sea*, vol. I, pp. 254–61.

The Battle of Britain was the first to be decided by aircraft, with the most intensive fighting by day lasting from 8 August to 7 September. The outcome might have been different if the Germans had persisted with their bombing attacks on radar stations and Fighter Command airfields instead of switching to raids on London. The RAF lost a higher percentage of its fighter pilots in August and September than the *Luftwaffe*, whose operations were intended to inflict losses on the defending fighters in the air. However, many members of the *Luftwaffe* command believed that only direct daylight attacks on London would be decisive and, following several RAF night raids over Berlin, the Germans changed their tactics. The Messerschmitt Bf 109 was at the limit of its combat range over London, and the twin-engined Messerschmitt Bf 110 was no match for the single-engined Spitfires and Hurricanes. The *Luftwaffe* was forced to abandon heavy daylight attacks, owing to losses among its lightly armed bombers, and by mid-October autumnal weather meant that the threat of invasion in 1940 was over. The Germans turned to night bombing to weaken British industry.¹¹⁰

Meanwhile the threat to Britain's trade routes had greatly increased. From France the *Luftwaffe* could attack coastal shipping and sea ports all round Britain, instead of only along the east coast, and U-boats could make extended voyages in the Atlantic. British losses of destroyers off Norway and Dunkirk had reduced the number of escort vessels, as did the need to deploy destroyers in an anti-invasion role until October. The agreement made by Churchill with Roosevelt on 5 September whereby fifty obsolete, surplus American destroyers of 1918–20 vintage were exchanged for the leasing to the United States of British bases in the western Atlantic was chiefly of political importance, since the destroyers had to be modernised in overworked British dockyards. Nevertheless they were made available at a critical time.¹¹¹ In the same month the German U-boats adopted their tactic of night attacks on convoys by 'wolf packs' on the surface, rendering Asdic almost useless, and from January 1941 the Germans increased the number of operational U-boats. The winter of 1940–1 was the only time when blockade might have defeated Britain, for the U-boats were sinking ships at a greater rate than they could be replaced, something that did not recur even when shipping losses were higher in 1942–3, for by then increased

¹¹⁰ Air Ministry, *The Rise and Fall of the German Air Force* (London: Public Record Office, 2001), pp. 79–95; T. C. G. James, *The Battle of Britain*, ed. Sebastian Cox (London: Frank Cass, 2000); Murray, *Luftwaffe*, pp. 43–59.

¹¹¹ Churchill, *Second World War*, vol. II, pp. 353–68; Roskill, *War at Sea*, vol. I, p. 348.

shipbuilding in the United States offset British losses.¹¹² It was in the period 1939–41 that Coastal Command was least effective against U-boats. Fortunately the *Luftwaffe* gave a low priority to attacks on merchant shipping, although for a time in 1941 its long-range reconnaissance aircraft played an important role in guiding U-boats to their targets.¹¹³ What is striking is that, despite the danger to Britain's trade routes, Coastal Command received a lower priority for new aircraft than Bomber Command. To understand why one has to look at how Churchill and the Chiefs of Staff hoped to win the war.

Notwithstanding Germany's conquests in Europe and trade with the Soviet Union, British intelligence still believed in the summer of 1940 that the German war machine was vulnerable to economic warfare on account of shortages of food, oil, rubber and textile fibres. Economic warfare was broadly defined, to include bombing and sabotage of industrial targets and communications, as well as blockade to deny Germany access to overseas trade.¹¹⁴ The Chiefs of Staff produced a Future Strategy paper on 4 September 1940 in which they predicted that the Germans' oil stocks might be exhausted by June 1941. They believed that the Germans could improve their position only by bringing the war to an end by defeating Britain, or by driving the Royal Navy from the Eastern Mediterranean, thereby enabling them to import oil from Romania and the Soviet Union by sea. The Chiefs of Staff concluded that an Italo-German attack on Egypt was likely within the next six months; that any steps to deprive Germany of oil would hasten her defeat; and that Britain should aim 'to pass to the general offensive in all spheres and in all theatres with the utmost possible strength in the spring of 1942'.¹¹⁵

The belief that the Eastern Mediterranean and Egypt might be a decisive theatre was not new. When Italy entered the war the British had four capital ships and an aircraft carrier at Alexandria, and a further three capital ships and an aircraft carrier at Gibraltar, against four operational Italian capital ships (plus two refitting), but the danger of attack from the large Italian air force led the Admiralty at the end of June to consider abandoning the Eastern Mediterranean. Churchill vetoed the idea, and in July urged that the air defences of Alexandria and Malta should be reinforced, although the Battle of Britain was about to begin.¹¹⁶ Then in

¹¹² Marc Milner, 'The Battle of the Atlantic', in Gooch (ed.), *Decisive Campaigns*, pp. 45–66, at pp. 49, 52.

¹¹³ Air Ministry, *Rise and Fall*, pp. 104–16; Bennett and Bennett, *Hitler's Admirals*, pp. 91–3, 143.

¹¹⁴ Hinsley, *British Intelligence*, vol. I, pp. 234–41.

¹¹⁵ 'Future strategy', COS (40) 683, 4 Sep. 1940, CAB 80/17, TNA.

¹¹⁶ Churchill, *Second World War*, vol. II, pp. 388–90, 392–3; Roskill, *War at Sea*, vol. I, pp. 295–8.

August, at the suggestion of the CIGS, Dill, the War Cabinet agreed to send 154 infantry tanks – about half the total available – to Egypt, although the outcome of the Battle of Britain was uncertain.¹¹⁷

It was, however, to Bomber Command that Churchill looked for decisive offensive action against Germany. On 3 September he wrote: 'fighters are our salvation, but bombers alone provide the means to victory'. He believed that only by pulverising 'the entire industry and scientific structure' of Germany could Britain hope to overcome the enemy's 'immense military power'.¹¹⁸ The Chiefs of Staff's emphasis on Germany's shortage of oil pointed to a more precise target. Oil refineries and synthetic plants were to be attacked whenever conditions were favourable, for example in good weather and when there was a full moon, but attacks on enemy morale by raids on Berlin or other urban centres were to be made at other times. Bomber Command was instructed by the Air Staff to follow the German technique of using incendiaries to start fires and then high-explosives to prevent fire brigades from tackling the fires. This was the technique that became known as area bombing.¹¹⁹

The Future Strategy paper of 4 September saw the purpose of blockade and bombing as wearing down the German economy until it would be possible for the British army to re-establish itself on the continent with a good chance of success, even although it would be inferior in numbers to the German army.¹²⁰ Churchill had created the Special Operations Executive (SOE) in July to pursue economic warfare by sabotage and to enable European resistance movements to prepare a general uprising to assist major operations by British forces.¹²¹ In the same month he had set up the Combined Operations Command to carry out raids using purpose-built landing craft, and by 1941 the production of many types of assault craft was under way, including ones big enough to land tanks on beaches.¹²²

The execution of the strategy worked out in September 1940 involved two choices: first, the balance between the offensive and defensive use of

¹¹⁷ See Reynolds, *In Command of History*, pp. 191–3 for how Churchill came to claim credit for this decision.

¹¹⁸ 'The munitions situation', memorandum by the Prime Minister, 3 Sep. 1940, WP (40) 352, CAB 66/11, TNA.

¹¹⁹ Webster and Frankland, *Strategic Air Offensive*, vol. I, pp. 155–60.

¹²⁰ 'Future strategy', COS (40) 683, 4 Sep. 1940, CAB 80/17, TNA.

¹²¹ David Stafford, 'The detonator concept: British strategy, SOE and European resistance after the fall of France', *Journal of Contemporary History*, 10 (1975), 185–217, at 202. See also M. R. D. Foot, *SOE in France: An Account of the Work of the British Special Operations Executive in France 1940–1944* (London: HMSO, 1966).

¹²² Churchill, *Second World War*, vol. II, pp. 217–23.

air power; and second, the allocation of sea, land and air forces as between the Middle East and Far East. As regards air power, the availability of better night-fighters for Fighter Command, and the movement of many *Luftwaffe* units to Eastern Europe in spring 1941 in preparation for the invasion of the Soviet Union, meant that debate centred on whether bombers were better used to attack Germany or to support the navy in the Battle of the Atlantic. The Air Staff had no doubts that the proper use of bombers was in the strategic air offensive, but by March 1941 merchant shipping losses were so great that Churchill directed Bomber Command to give priority over the next four months to attacking U-boats at sea, in dock, or in building yards, and to counteracting *Luftwaffe* operations against shipping. German battle-cruisers at Brest were also bombed, although the head of Bomber Command was sure that there was not much chance of destroying these ships.¹²³ However, when there was a marked reduction in merchant shipping losses in July 1941, Churchill demanded to know why new American bombers were being allocated to Coastal Command instead of to the bomber offensive, and in October the First Sea Lord and the CAS had to resist pressure from the Prime Minister to transfer aircraft from Coastal Command to Bomber Command.¹²⁴

From December 1941 merchant shipping losses began to mount again, partly because the U-boats were able to take advantage of American unpreparedness when Germany declared war on the United States on 10 December. There was a debate in Whitehall about the relative advantages of protecting shipping and bombing German towns. The most extreme viewpoint was put to Churchill by the head of Bomber Command on 17 June 1942. Harris claimed that the 'over-swollen establishment of the purely defensive' Coastal Command achieved nothing essential, either to Britain's survival or the defeat of the enemy, and prevented very few shipping losses. He believed that Coastal Command should be redirected from its 'mainly futile' defensive role to the offensive, in combination with Bomber Command.¹²⁵ In fact, as we have seen, it was in 1942 when Coastal Command at last became proficient in attacking U-boats; what it needed were long-range aircraft. Agreement on the allocation of aircraft between Bomber Command and Coastal Command was not reached until November 1942 (see below, p. 217).

Meanwhile, the inability of Bomber Command to do significant damage to oil targets, or transport systems, which for a time became an

¹²³ Webster and Frankland, *Strategic Air Offensive*, vol. I, pp. 165, 167.

¹²⁴ Buckley, *RAF and Trade Defence*, pp. 127–8.

¹²⁵ Memorandum by Harris, 17 June 1942, PREM 3/19, TNA.

alternative priority, led inexorably to area bombing. The technical reasons for this policy have already been noted. The question asked here is: what did Bomber Command hope to achieve by way of fulfilment of the overall war strategy of weakening Germany prior to re-establishing the army on the European continent? By the autumn of 1941 the chief target was the morale of German workers, but Churchill doubted whether, in the light of British reactions to bombing, such a strategy would be decisive. He wrote to the CAS on 7 October that, if the United States entered the war, the air offensive 'would have to be supplemented in 1943 by simultaneous attacks by armoured forces in many of the conquered countries which were ripe for revolt'.¹²⁶ Following heavy losses in November 1941, the Prime Minister insisted that Bomber Command's strength should be conserved until the spring of 1942.

Churchill's faith in the value of a strategic air offensive was partially restored in 1942. His scientific adviser, Lindemann, now Lord Cherwell, persuaded the Lord President of the Council, Anderson (himself trained as a scientist), to set up an enquiry by two scientists, Solly Zuckerman and J. D. Bernal, into the effects of bombing of British cities. Even before the enquiry's findings were circulated in April 1942, Cherwell was advising Churchill that the best use of Bomber Command would be to damage the German people's morale by destroying their homes. Cherwell wrongly anticipated that Zuckerman and Bernal would show that area bombing would break the spirit of the German people, whereas the evidence of Hull and Coventry suggested the reverse was true. Nevertheless, he did not allow that evidence to weaken his case, which was based on a belief that German cities would be subjected to far heavier bombing than anything experienced by the British. He assumed that the over-ambitious programme for producing 10,000 heavy bombers over the next fifteen months would be fulfilled, although in February the Ministry of Aircraft Production had made the first of what proved to be a series of modifications to the programme to make it more realistic. Sir Henry Tizard, a scientist who had been advising the Air Ministry since the 1930s, and who favoured the proposed policy of area bombing in principle, demonstrated that Bomber Command would not have the resources to strike a decisive blow before mid-1943 at the earliest, and that the attempt to do so might lead to the loss of the war by the diversion of aircraft from other purposes, including trade defence. The Cherwell-Tizard debate paralleled the debate between the Air Staff and the Naval Staff, and a judge, Mr Justice Singleton, was asked to review the likely results of bombing Germany. Singleton reached no

¹²⁶ Webster and Frankland, *Strategic Air Offensive*, vol. I, p. 184.

clear conclusions in his report on 20 May 1942, but he did make the point that the bombing offensive helped the Soviet Union by forcing the Germans to divert resources to air defence.¹²⁷

This was a powerful consideration at a time when there was pressure on Britain from the Soviet Union and the United States to open a second front in France.¹²⁸ In the spring and summer of 1942 Bomber Command was beginning to have some success, including a spectacular one-thousand bomber raid on Cologne on 30 May. Harris, who had established excellent relations with Churchill, argued that the strategic air offensive could reduce a continental land campaign to a mopping up exercise.¹²⁹ Churchill did not take so exaggerated a view of air power, but in a review of the war position in July 1942 he looked to a combined British and American air offensive to cripple German U-boat and aircraft production, and to prepare the conditions for major military operations on the continent.¹³⁰

Meanwhile the defence of the Empire and overseas interests had been a heavy burden on British, dominion and Indian forces. The Italians had made the first moves, occupying British Somaliland in August 1940, and pushing fifty miles into Egypt from Libya in September. The British forces in the Middle East lacked modern equipment, and the Australian and New Zealand contingents there were still undergoing training, but the bold stroke of sending modern tanks to Egypt gave the General Officer Commanding-in-Chief, Middle East, Wavell, the means of defeating the Italian army in Egypt in December and advancing to the border of Tripolitania by 9 February 1940.¹³¹ The *Regia Aeronautica* proved to be less of a threat than anticipated and the Royal Navy seized the initiative in the Mediterranean, disabling or sinking half of Italy's capital ships and 8-inch-gun cruisers between November 1940 and March 1941.¹³²

This successful period was brought to an end by the intervention of the Germans, first by sending *Luftwaffe* squadrons to the Mediterranean

¹²⁷ The Singleton report is reproduced in Webster and Frankland, *Strategic Air Offensive*, vol. IV, pp. 231–8. For Zuckerman's account of Cherwell's misguided use of the British evidence, and of the Cherwell-Tizard debate, see Solly Zuckerman, *From Apes to Warlords 1904–46, An Autobiography* (London: Hamish Hamilton, 1978), pp. 141–8, 405.

¹²⁸ Churchill, *Second World War*, vol. IV: *The Hinge of Fate* (1951), pp. 281–308.

¹²⁹ Memorandum by Harris, 17 June 1942, PREM 3/19, TNA.

¹³⁰ Memorandum by the Prime minister, 21 July 1942, reproduced in Churchill, *Second World War*, vol. IV, pp. 781–4.

¹³¹ For the decisive impact of British tanks on the the Italian army, see Lucio Ceva, 'The North African campaign, 1940–43', in Gooch (ed.), *Decisive Campaigns*, pp. 84–104, at p. 87.

¹³² Roskill, *War at Sea*, vol. I, pp. 300–1, 419, 427–31.

at the end of 1940 and then by sending an army into Bulgaria in March 1941 with a view to coming to the rescue of the Italians, whose attack on Greece in October 1940 had turned out badly. A paper dated 16 February 1941 by the Director of Military Operations, Sir John Kennedy, made out a cogent case for Wavell's army pushing on to Tripoli, to deny the Germans a foothold in Africa and to improve air cover for British ships in the central Mediterranean. Nevertheless, the Chiefs of Staff decided on 23 February that for political reasons some of Wavell's forces should be sent to support the Greeks.¹³³ Cyril Falls subsequently described British intervention as 'a sorry tale of political and strategic frivolity'.¹³⁴ Certainly there was a case to answer. The Chiefs of Staff regarded the enterprise as hazardous. The RAF was short of aircraft, especially fighters. Although Wavell considered that there was a good chance that an enemy advance could be stopped, the detailed military appreciation that Churchill requested was never received. Churchill himself felt that the loss of Greece would not be a major catastrophe, provided Turkey remained an 'honest neutral'. The official history suggests that the decisive factor was a feeling that it would be less damaging to British prestige to suffer defeat than to leave the Greeks to their fate.¹³⁵

Falls had the benefit of hindsight. While the British were preparing to send troops to Greece, the Germans were establishing their *Afrika Korps* in Libya, the first troops having arrived on 8 February, and a panzer and a light (mechanised) division were ready to take the offensive at the end of March. By that date the British had two armoured divisions in the Middle East, but one was refitting after its successful operations against the Italians; the other was divided between Cyrenaica and Greece. The Germans' advantage in armour and the daring of their commander, General Erwin Rommel, led in April to the British being driven from Cyrenaica apart from the port of Tobruk, which withstood an eight-month siege. Meanwhile the Germans drove the British Commonwealth expeditionary force out of Greece by the end of the month. To complete British discomfiture, Crete was taken by German airborne troops between 20 May and 1 June. German air power inflicted heavy losses on the Royal Navy, which found itself on the defensive, concentrating on supplying Malta.¹³⁶ On the other hand, success was not all on one side.

¹³³ *The Business of War: The War Narrative of Major-General Sir John Kennedy*, ed. Bernard Fergusson (London: Hutchinson, 1957), pp. 80–5.

¹³⁴ Cyril Falls, *The Second World War: A Short History* (London: Methuen, 1948), p. 91.

¹³⁵ Butler, *Grand Strategy*, vol. II, pp. 442–7; Churchill, *Second World War*, vol. III: *The Grand Alliance* (1950), pp. 89–90, 92.

¹³⁶ Playfair, *The Mediterranean and the Middle East*, vol. II, esp. pp. 12, 147.

By holding Malta the British retained a base from which to attack Rommel's seaborne supplies. An Iraqi government suspected of pro-Axis sympathies was overthrown and the country occupied in May, and Syria was wrested from Vichy control in June. These campaigns preventing German penetration of the Middle East were undertaken mainly by formations not equipped to the standard required to face the *Afrika Korps* (horsed cavalry were used by the British army for the last time in Syria). The Italian forces in East Africa were defeated between February and May 1941, removing a potential threat to communications through the Red Sea.

The presence of two German divisions, and their Italian allies, on the Egyptian frontier in late April had a profound effect on British grand strategy. On 28 April Churchill issued a directive in which he stated that the loss of Egypt and the Middle East would be a disaster of the first magnitude, second only to a successful invasion of Great Britain. On the other hand, he believed that the danger of Japan entering the war was remote and that, if she did, the United States would almost certainly come in on Britain's side.¹³⁷ The CIGS, Dill, pointed out on 6 May that it was 'an accepted principle of our strategy that in the last resort the security of Singapore comes before that of Egypt'; yet Singapore's defences were well below what was required.¹³⁸ Churchill responded that Singapore required only a small fraction of the forces required for the defence of Egypt, and that therefore Singapore and Egypt were not comparable alternatives.¹³⁹ Churchill's refusal to agree to air reinforcements for the Far East proved to be crucial. After the fall of France, defence policy in the Far East had been recast, given the need to retain a British fleet in the Mediterranean, and the likelihood that Japan would use French Indo-China as a springboard for operations. The Chiefs of Staff considered in August 1940 that it would be necessary to defend the whole of Malaya, not just Singapore. Primary responsibility for the defence of the peninsula had been given to the RAF, but of the planned frontline strength of 336 aircraft, only 150 were in place in June 1941, and no more than 158 in December, many of them obsolescent. The army's garrison remained at the size that had been planned on the assumption that the main burden would fall on the air force, although in

¹³⁷ 'Directive by the Prime Minister and Minister of Defence', 28 Apr. 1941, WO 216/5, TNA.

¹³⁸ 'The relation of the Middle East to the security of the United Kingdom', 6 May 1941, WO 216/5, TNA.

¹³⁹ Prime Minister to Chief of General Staff, 13 May 1941, WO 216/5, TNA. For Churchill repeatedly holding up air reinforcements for the Far East, see *Churchill War Papers*, vol. III, pp. 81, 476, 774.

July 1941 the new commander in Malaya, General A. E. Percival, estimated that five divisions, instead of ten brigades were required. As the official history notes, it was evident by that date that 'existing plans for the defence of Malaya had broken down'.¹⁴⁰ Nevertheless, Churchill, anxious to support the Soviet Union, which had suffered heavy defeats since June, particularly with regard to its air force, preferred in August to offer to send 445 modern fighter aircraft to Murmansk.¹⁴¹

Most of the controversy over the fall of Singapore is centred on naval strategy and in particular the loss of a new capital ship, the *Prince of Wales*, and the battle-cruiser *Repulse* when they were attacked off the coast of Malaya by Japanese aircraft on 10 December 1941.¹⁴² Churchill had told the prime ministers of Australia and New Zealand at the end of October that the *Prince of Wales* would be the best possible deterrent to Japanese aggression, and he boasted to Stalin that it could 'catch and kill any Japanese ship'.¹⁴³ His blindness to the danger of land-based air attack is surprising, in view of British losses off Crete a few months earlier. His defence in his memoirs was that, after the Japanese declaration of war, the capital ships should have crossed the Pacific to join the American fleet, the existence of an Anglo-American fleet being the best possible shield for Australia.¹⁴⁴ The Admiralty's plans had been more ambitious, aiming at offensive action in the South China Sea by a fleet of older capital ships operating under cover of land-based aircraft. During Anglo-American naval talks between October 1940 and April 1941 the Americans had made plain that they expected the British to make a substantial contribution to the defence of the Far East. In August the Admiralty became aware that the Americans intended to hold the Philippines in strength, and by September its plans envisaged holding a line from Hong Kong to Manila, with the latter being used as

¹⁴⁰ Butler, *Grand Strategy*, vol. II, pp. 506–7; J. M. A. Gwyer and J. R. M. Butler, *Grand Strategy*, vol. III (London: HMSO, 1964), p. 278.

¹⁴¹ Churchill, *Second World War*, vol. III, p. 403.

¹⁴² There is a huge literature on this subject, most of it highly critical, including Paul Haggie, *Britannia at Bay: The Defence of the British Empire against Japan 1931–1941* (Oxford: Clarendon Press, 1981); Ian Hamill, *The Strategic Illusion: The Singapore Strategy and the Defence of Australia* (Singapore University Press, 1981); Arthur J. Marder, *Old Friends, New Enemies: The Royal Navy and the Imperial Japanese Navy, Strategic Illusions 1936–1941* (Oxford: Clarendon Press, 1981); W. David McIntyre, *The Rise and Fall of the Singapore Naval Base, 1919–1942* (London: Macmillan, 1979); and Alan Warren, *Singapore: Britain's Greatest Defeat* (London: Hambledon and London, 2002). Christopher Bell, 'The "Singapore strategy" and the deterrence of Japan: Winston Churchill, the Admiralty and the dispatch of Force Z', *English Historical Review*, 116 (2001), 604–34, points out that the purpose of sending out the *Prince of Wales* and the *Repulse* was to deter war rather than to make a commitment to a particular war strategy.

¹⁴³ Churchill, *Second World War*, vol. III, pp. 469, 525. ¹⁴⁴ Ibid., p. 547.

an advanced base for six British capital ships, provided it could be made secure from air attack.¹⁴⁵ In the event, the necessary dispositions had not been made by December.

Britain's Far Eastern strategy quickly collapsed. Hong Kong fell on 25 December. The largely inexperienced British, Australian and Indian troops in Malaya were no match for Japanese veterans of the Sino-Japanese war who landed in the north of the peninsula, where they quickly seized airfields built for the RAF. The surrender of Singapore on 15 February, and the loss of 140,000 men, mostly taken prisoner, to a numerically inferior Japanese force, was a shock that Churchill blamed on the failure of those responsible for the defence of the base there to turn it into the fortress of his imagination.¹⁴⁶ He did not explain how even a fortified Singapore could have been held once the numerically inferior RAF had been defeated. The conquest of Malaya gave Japan 75 per cent of the world's natural rubber and 66 per cent of the tin, and the subsequent loss of the Dutch East Indies provided her with enough oil for her needs. The loss of Burma between December 1941 and March 1942, and Japanese naval raids on Ceylon in April, accompanied by the sinking in the Indian Ocean of a British aircraft carrier and two cruisers, reinforced the sense of British powerlessness. Fortunately the Japanese did not press home their advantage. On 5 May British forces landed in Madagascar to deny the Japanese bases on that Vichy-controlled island. Even so, the preservation of communications across the Indian Ocean depended on the success of the US Navy in the Pacific.

The priority given to the defence of Egypt had disappointing results. British Commonwealth forces built up there engaged in a series of battles in the Western Desert from 18 November 1941, eventually ending the siege of Tobruk on 8 December, and driving the *Afrika Korps* out of Cyrenaica. However, Rommel counter-attacked in January–February 1942 and recovered most of Cyrenaica. In late May he mounted another offensive, driving the Eighth Army back into Egypt, where it made a successful stand at El Alamein in July. Most disappointing to Churchill was the fall of Tobruk on 20 June. He heard the news while he was in conference with Roosevelt in Washington and, when asked by the President what the United States could do to help,

¹⁴⁵ Ian Cowman, 'Main fleet to Singapore? Churchill, the Admiralty, and Force Z', *Journal of Strategic Studies*, 17 (1994), no. 2, 79–93. Bell, 'The "Singapore strategy"' shows that Cowman's belief that the Admiralty sought to conceal its plans from Churchill is unfounded.

¹⁴⁶ Reynolds, *In Command of History*, pp. 296–7. For an illuminating account of the campaign, see Masanobu Tsuji, *Singapore: The Japanese Version* (London: Constable, 1962).

replied: 'give us as many Sherman tanks as you can spare'.¹⁴⁷ Once more Britain had to turn to the United States for help.

British strategy from the fall of France to July 1942 was ambitious with regard to defeat of Germany, but was not, on the whole, a success after the Battle of Britain. The Germans were able to offset the effects of blockade by plunder of conquered countries and by putting pressure on neutrals to supply raw materials. The strategic air offensive against Germany was not decisive because Bomber Command lacked the technology and numbers to damage German industry. Moreover, strategic bombing had its opportunity cost. Air power might have been used to greater advantage against U-boats and in support of the army and navy in the Middle East and, especially, the Far East. British agents and commandos helped to inspire the European resistance, but the prospects for widespread revolt against the Germans in Europe seemed remote, except in Yugoslavia and Greece, and even in these countries the resistance was weakened by conflict between Communist and non-Communist forces.

The defeat of the German army would depend upon the operations of Britain's allies as well as on those of an enlarged British army. Here sea power could make a contribution: munitions sent to Murmansk could encourage the Soviet Union to soldier on, even if some of the equipment was inferior to Soviet models, and the responsibility for ensuring that the Arctic convoys got through fell to the British Home Fleet. The *Luftwaffe*, U-boats and German surface vessels posed such a threat in 1942 that the Admiralty wanted to suspend the convoys during the long summer days. Roosevelt insisted that the convoys continue; Churchill promised Stalin that they would; but when two-thirds of the merchant ships in convoy PQ 17 were lost in July, even Churchill had to agree that no more convoys would sail to Murmansk until the autumn.¹⁴⁸ July 1942 was not a good time to suspend aid to the Soviet Union, for in that month the Germans took the Russian fortress of Sevastopol and were advancing towards the oilfields of the Caucasus, and Stalin was bitterly reproachful of the British decision. Fortunately there was another route by which supplies could reach the Soviet Union, through Iran, which British and Soviet forces had occupied in August 1941 to suppress German influence. However, the German advance in the Caucasus in 1942 raised doubts about the security even of this route, or

¹⁴⁷ Churchill, *Second World War*, vol. IV, p. 344.

¹⁴⁸ James P. Levy, *The Royal Navy's Home Fleet in World War II* (Basingstoke: Palgrave, 2003), pp. 108–25.

indeed about the northern flank of the British position in the Middle East.¹⁴⁹

Grand strategy: coalition warfare July 1942–August 1945

The entry of the United States into the war as a combatant had, as Churchill had foreseen, a huge, if delayed, impact on all aspects of grand strategy. American support helped to make the blockade more complete as regards overseas supplies to Germany, although it was only after neutrals close to Germany had confidence in imminent Allied victory that supplies such as Swedish ball-bearings, Spanish wolfram and Turkish chrome were denied to the enemy in 1944.¹⁵⁰ Germany's chances of seizing the oilfields of the Middle East and the Caucasus, and of shipping Romanian oil via the Eastern Mediterranean, faded in late 1942 as a result of the battles of El Alamein and Stalingrad, but it was the arrival of American forces that swung the balance of power in North Africa decisively in favour of the Allies. The appearance of strategic bombers of the USAAF's Eighth Air Force over Western Europe from August 1942 meant that it was no longer necessary for Bomber Command to attempt to have a decisive impact on its own. In September 1941 the Air Staff had estimated that Bomber Command would require 4,000 frontline heavy bombers to defeat Germany by area bombing. This figure was beyond what British industry could achieve, especially if the needs of the other services were to be met, but by September 1944 Bomber Command and the American Eighth and Fifteenth Air Forces had a combined average daily operational strength of 4,609 bombers, of which two-thirds were American.¹⁵¹ Moreover, the huge output of aircraft from the United States meant that it was no longer necessary to starve Coastal Command of long-range aircraft for the benefit of Bomber Command, and a War Cabinet Anti-U-boat Warfare Committee chaired by Churchill reached agreement on 18 November 1942 on strengthening Coastal Command.¹⁵² As regards the liberation of Europe, resistance movements could be expected to gain more popular support once the prospects of Allied victory improved, and the combination of the American and British Commonwealth armies would be big

¹⁴⁹ Gwyer and Butler, *Grand Strategy*, vol. III, pp. 446–7, 589–91; Michael Howard, *Grand Strategy*, vol. IV (London: HMSO, 1972), pp. 34–6, 51, 53–4.

¹⁵⁰ Medlicott, *Economic Blockade*, vol. II, pp. 638–9.

¹⁵¹ Webster and Frankland, *Strategic Air Offensive*, vol. I, p. 182; Craven and Cate (eds.), *Army Air Forces*, vol. III, p. 596. The Eighth Air Force was based in the United Kingdom and the Fifteenth in Italy.

¹⁵² Roskill, *War at Sea*, vol. II, pp. 77–90.

enough for an invasion, given that most of the German army was on the Russian front.

The strategic problems of making the best use of scarce resources were thus eased by the resources becoming less scarce, but choices still had to be made. Grand strategy had to be worked out within the framework of a coalition, in which the three principal members necessarily had different priorities. Stalin was understandably anxious that the burden of war against Germany on land should not be borne almost entirely by the Soviet Union. The United States might have been expected to settle scores first with Japan, and indeed the US Navy did give priority to the Pacific war, although Churchill and Roosevelt agreed in Washington in December 1941 that the Allies should aim to defeat Germany first. Britain's interests were world-wide and her manpower was limited, and Churchill hesitated to commit the British army to open a second front in France before Germany had been significantly weakened by air power and economic warfare. Britain's relative contribution to the war compared with that of the United States was declining: by December 1944 the British army was only about one-half of the American, and Churchill expected that it would soon be little more than a third.¹⁵³ In February 1945 he spoke of Britain as a 'small lion' in the company of a 'huge Russian bear' and a 'great American elephant'.¹⁵⁴ British strategy depended very much upon what the Americans could be persuaded to agree to.

The British government had to take decisions in the autumn of 1942 on how to allocate manpower between the services and munitions production, since the demands of the services far exceeded what the Ministry of Labour and National Service could find. In September Churchill had told the Secretary of State for Air, Sir Archibald Sinclair, that the strength of Bomber Command must be increased, and the Air Ministry had secured approval of a large increase in production of bombers that would require an increase of 850,000 workers in the aircraft industry. In view of the increased scope of the war, Churchill had also recently issued a directive stating that the Ministry of Supply should equip the equivalent of 100 divisions, 23 of them armoured, including Commonwealth and Allied forces attached to the British Army, by April 1943. The Admiralty, in view of the heavy losses being incurred in the Battle of the Atlantic, wanted a greater proportion of national output to go to naval construction, and required crews for the additional ships due to be completed in 1943. The Lord President, Anderson, surveying the

¹⁵³ Churchill, *Second World War*, vol. VI: *Triumph and Tragedy* (1954), p. 233.

¹⁵⁴ Colville, *Fringes of Power*, p. 564.

manpower budget for the eighteen months ending December 1943, concluded that it would not be possible to meet the essential needs of the navy, build up an army of 100 divisions, and equip an air force of 600 squadrons. Churchill decided on 28 November that the Battle of the Atlantic should for the time being have overriding priority, and also suggested that aircraft production should have priority over increasing the RAF's manpower, and that the reduced threat to the United Kingdom from the *Luftwaffe* should make possible reductions in air defences. The final allocation agreed by the War Cabinet on 11 December gave the army and air force little more than half of their estimated additional manpower requirements, and manpower for the Ministry of Supply was reduced.¹⁵⁵ This allocation reflected the Chiefs of Staff's agreement that strategic bombing was required to undermine Germany's military power before an invasion, but that two-thirds of the bombing force would be American, and that the resources allocated to Bomber Command should not impair the navy's ability to secure supply by sea or the army's ability to mount an invasion of Europe in 1943. The army, however, would have to rely increasingly on American sources for its equipment.¹⁵⁶

As regards how Allied forces should be deployed, Churchill had wished as early as December 1941 to secure French North Africa to forestall a German occupation of naval bases on the Atlantic coast, and to add the French army there to the Allied forces.¹⁵⁷ On his second visit to Washington in June 1942 he dismissed the possibility of a cross-Channel invasion of France before 1943, but argued that the Allies could not remain idle in 1942. The conclusion of his talks with Roosevelt was that preparations for a landing in France in 1943 should go ahead and the possibilities of French North Africa, Norway and the Iberian Peninsula in the autumn and winter of 1942 should be studied by the Anglo-American Combined Chiefs of Staff.¹⁵⁸ North Africa was chosen at an Anglo-American conference in the following month for what would be the first major seaborne invasion. The size of Allied forces that could be deployed in the autumn of 1942 was subject to the degree of success that could be achieved in the Battle of the Atlantic. However, it was equally true that the Royal Navy and the RAF,

¹⁵⁵ Gwyer and Butler, *Grand Strategy*, vol. III, pp. 546–7; Hancock and Gowing, *British War Economy*, pp. 441–7; Howard, *Grand Strategy*, vol. IV, pp. 6–7; Postan, *British War Production*, pp. 221–5; Webster and Frankland, *Strategic Air Offensive*, vol. I, p. 343.

¹⁵⁶ Howard, *Grand Strategy*, vol. IV, pp. 197–208; Webster and Frankland, *Strategic Air Offensive*, vol. I, p. 366, 372–4.

¹⁵⁷ Churchill, *Second World War*, vol. III, pp. 574–8.

¹⁵⁸ Churchill, *Second World War*, vol. IV, pp. 342–5.

operating from Malta and Egypt, were successfully limiting supplies to Axis forces in North Africa. By 23 October the new commander of the Eighth Army, General Bernard Montgomery, was ready to take the offensive at El Alamein, forcing Rommel to retreat from Egypt and Libya. The opposition of Vichy forces to the Anglo-American landings in Morocco and Algeria on 8 November was slight, but hopes of a complete occupation of the North African coast were deferred by a German invasion of Tunisia.

Matters stood thus when future strategy was discussed with the Americans at the Casablanca conference in January 1943. It was common ground between the American and British chiefs of staff that most resources should be devoted to the defeat of Germany, but whereas the Americans wanted to devote 30 per cent to the Pacific, instead of the existing proportion of 15 per cent, so as to prevent the Japanese digging in, the British thought in terms of finding out what minimum would be necessary to prevent further Japanese expansion. No figures appeared in the document setting out Allied strategy, and in any case nearly all the resources to be used in the Pacific were under American control. It was decided that a beginning should be made in 1943 to retaking Burma, with the aim of reopening land links with China. With regard to European operations in 1943, the main choice to be made was between exploiting the Allies' success in North Africa by knocking Italy out of the war, and perhaps bringing Turkey in on the Allied side, or invading France from the United Kingdom, since it was unlikely that landing craft used in the Mediterranean could be transferred to the English Channel before the weather broke in the autumn. The British Chiefs of Staff preferred the Mediterranean strategy, as did Churchill, although the Prime Minister wanted the possibility of a cross-Channel operation in August or September left open. General George Marshall, the chief of staff of the US Army, was opposed to indefinite operations in the Mediterranean and believed that the decisive effort must be made in France. The British argued that a Mediterranean strategy would divert more Germans from the Russian front than a cross-Channel operation would, since, if the Italians surrendered, the Germans would be forced to occupy Italy and to replace Italian troops in the Balkans. The Germans already had forty-four divisions in France, more than enough to cope with anything that the twenty-one to twenty-four divisions that the Allies could assemble in the United Kingdom in 1943 could do. It was agreed, therefore, to invade Sicily once the Axis forces in Tunisia had been dealt with, and to weaken Germany by strategic bombing while a force large enough to invade France was assembled in the United

Kingdom. The Battle of the Atlantic was to remain the first charge on resources.¹⁵⁹

The strategic air offensive began to have a decisive impact in 1943. The Casablanca conference failed to resolve the issue of whether it was better to attack selected targets, particularly submarine construction yards, aircraft factories, transport systems and oil plants, or whether weakening German morale through destroying housing was a more realistic objective. The Americans preferred the selective approach by day; the British preferred area bombing by night. At least this division of labour made co-ordination of the efforts of Bomber Command and the USAAF Eighth Air Force based in Britain easier. Bomber Command did considerable damage to the towns of the Ruhr and to Berlin. Especially devastating were the fire raids on Hamburg from 24 July to 3 August, which permanently reduced production in that city. The fact that German production of strategic goods such as steel, petroleum and synthetic rubber, and also aircraft, rose in 1943 might suggest that Germany was not much weakened by the strategic air offensive in that year, but increased output was possible because the German economy had had spare capacity earlier and production would have been even greater in the absence of bombing. Both Bomber Command and the USAAF suffered heavy losses. However, they were not alone in this. The German day-fighter force suffered an unsustainable attrition rate, especially after the Americans increased the numbers of escort fighters late in the year. The inability of the *Luftwaffe* to oppose the Allied invasion of France, when it came, showed that Germany had been weakened by the strategic air offensive, although not in the way that the British Air Staff or Harris had expected.¹⁶⁰ The Russians also benefited from the Germans being forced to devote 41 per cent of their munitions output to aircraft in 1943, compared with 6.27 per cent to tanks. As Phillips O'Brien has argued, in material terms, if not in military manpower, the decisive theatre was in the west rather than the east.¹⁶¹

Meanwhile, the Axis armies in Tunisia had surrendered in May; Sicily fell between 10 July and 17 August, and the invasion of Italy followed on 3 September, after the Italian government that had replaced Mussolini had indicated a wish to surrender. However, the Germans held most of

¹⁵⁹ See Michael Howard, *The Mediterranean Strategy in the Second World War* (London: Weidenfeld and Nicolson, 1968).

¹⁶⁰ Alan S. Milward, *War, Economy and Society 1939–1945* (London: Allen Lane, 1977), pp. 79, 298–302; Overy, *Air War*, pp. 123–5; Webster and Frankland, *Strategic Air Offensive*, vol. II, pp. 10–16, 236–7, 244–300; Murray, *Luftwaffe*, pp. 186–211.

¹⁶¹ Phillips P. O'Brien, 'East versus West in the defeat of Nazi Germany', *Journal of Strategic Studies*, 23 (2000), no. 2, 89–113.

the country, and there followed a long and arduous campaign that was not concluded until 29 April 1945. There were major debates between the British and the Americans on how far to take the Mediterranean strategy. British planners considered options from Sardinia to the Aegean, but the American chiefs of staff made clear at the second Washington conference in May 1943 that they were opposed to anything that might detract from or delay a cross-Channel attack. It was agreed that forces would be concentrated in Great Britain ready to mount an operation by 1 May 1944, but at the first Quebec conference in August 1943 the British succeeded in incorporating the principle of flexibility regarding Mediterranean operations in the Combined Chiefs of Staff's conclusions.¹⁶²

Churchill was keen to take advantage of the opportunities apparently offered by the Italian surrender to seize the Dodecanese Islands and perhaps bring Turkey into the war. However, once more the Germans had anticipated events and sent reinforcements, while the supply of landing craft available to the British in the Eastern Mediterranean had been reduced in August by a decision at the Quebec conference to transfer them to the Indian Ocean ready for operations against the Japanese. Small British units landed on Kos, Leros and Samos in the middle of September, but only the first of these islands had an airfield from which the RAF could operate, and the Germans quickly took it on 4 October. After that date air support depended on aircraft based in Egypt or Italy. Churchill appealed on 7 October to Roosevelt for landing craft that had been earmarked for preparations for the cross-Channel invasion of France to be diverted temporarily to the Aegean to enable the British to recapture Kos and take Rhodes. However, the President refused to allow any delay in the timetable that had been settled in May, or to agree to any diversion of forces from Italy for what might prove to be the beginning of a Balkan campaign. Nor did Churchill have support from his own CIGS, Brooke, who thought that commitments in Italy precluded serious operations in the Aegean, and believed that the Prime Minister was unbalanced on the subject of Rhodes. Churchill was bitterly disappointed at the lack of American support, and efforts in November to bring Turkey into the war fared no better, since the British could not promise the Turks as much air support as they demanded. Lack of air cover led to the loss of the remaining British footholds in the Aegean by 27 November, by which time the British had lost six destroyers and two submarines sunk and four cruisers and two

¹⁶² Howard, *Grand Strategy*, vol. IV, pp. 411–20, 425–32, 561–70.

destroyers damaged.¹⁶³ The operations were on a small scale, involving only a few thousand men, but the whole affair illustrated Britain's inability to conduct an independent strategy in the Mediterranean.

The Cairo and Tehran conferences in November and December 1943 underlined the point. The British managed to fend off an American proposal that a single supreme commander should be appointed for operations in the Mediterranean and North-West Europe, and also to control the strategic air forces in the Mediterranean and the United Kingdom. Instead there would be one commander for the Mediterranean, who would be British, and one for North-West Europe, who would be American, and the question of control of the strategic air forces was left open. At Tehran, Stalin pressed the British to commit themselves firmly to a cross-Channel operation in May 1944; the Americans naturally agreed with him, and all that Churchill could secure was agreement that operations in the Aegean would be desirable, provided that they could be fitted in without detriment to landings in France.¹⁶⁴ The British did return to Greece in October 1944, but only after the Germans had evacuated the country to avoid being cut off by the Russian advance across the Balkans. Notwithstanding the fact that the Allied Commander in the Mediterranean, General Sir Harold Alexander, was British, American views prevailed over those of Churchill on the relative importance of a landing in the south of France and an all-out offensive in Italy. Against the advice of the British Chiefs of Staff, three American and four French divisions were transferred from Italy to attack Toulon and Marseilles on 15 August and to link up with the Allied forces advancing from Normandy, leaving only twenty divisions to continue the Italian campaign.¹⁶⁵

The commitment of a large part of the British army to the Mediterranean and elsewhere meant that of the thirty-five divisions required for the cross-Channel invasion of France, only sixteen would be British, and that subsequent reinforcements would have to come from the United States. The overriding importance of the cross-Channel operation was such that from April to September 1944 the direction of Bomber Command was transferred to the American Supreme Commander of the Allied Forces in North-West Europe, General Dwight Eisenhower. The appointment of Air Chief Marshal Sir Arthur Tedder as deputy supreme commander, with his experience of air co-operation in North Africa, ensured that optimal use was made of Allied air power.

¹⁶³ Churchill, *Second World War*, vol. V: *Closing the Ring* (1952), pp. 186–200; Alanbrooke, *War Diaries*, pp. 458–9; John Ehrman, *Grand Strategy*, vol. V (London: HMSO, 1956), pp. 91–103.

¹⁶⁴ Ehrman, *Grand Strategy*, vol. V, pp. 168–83, 189. ¹⁶⁵ *Ibid.*, pp. 348–58, 361–7.

Preparation for what became the D-Day landings in Normandy on 6 June involved air attacks by heavy bombers on German communications in France, especially railway marshalling yards, as well as targets hitherto the preserve of tactical air units: coastal batteries, ammunition dumps and military camps.

The Normandy campaign was the last time that the British Commonwealth and the United States could be regarded as equals: 83,000 British and Canadians, and 73,000 Americans, landed on the Normandy beaches on D-Day. Eisenhower was in overall command but Montgomery, as 21st Army Group commander, directed land operations until 1 September, when Eisenhower took over. The balance of the opposing land forces in Western Europe in June 1944 was quite even: thirty-seven Allied divisions in the United Kingdom, plus seven in Italy earmarked for the landings in the south of France, faced fifty-eight German divisions, but there were about forty more American divisions in reserve in the United States. Moreover, German units were frequently delayed in reaching the front by air attacks and sabotage, the latter often organised by SOE. Even so, it was not until 19 August that the Germans were in headlong retreat.

After the victory in Normandy, Montgomery saw the task of the 21st Army Group as the destruction of the enemy forces in northern France, the clearance of the Pas de Calais with its V-bomb sites, and the capture of Antwerp. He also believed that the Allies should make a single, powerful thrust with about forty divisions on a narrow front over the Rhine into Germany, under his command. Eisenhower rejected the plan on 23 August, preferring to advance on a wide front, linking up with the American Seventh Army advancing from the south. From 1 September Montgomery was in charge of only one of three army groups. He believed that an opportunity to end the war in 1944 had been lost, and subsequently let his views be known to Chester Wilmot, whose *Struggle for Europe* (1952) stated that Montgomery's advance from the Seine to Antwerp in nine days 'amply demonstrated that the Ruhr was vulnerable to just such a stroke as he had proposed to Eisenhower'.¹⁶⁶ American critics of Montgomery claimed that he was at fault in allowing the German army that had been guarding the Pas de Calais to escape and in failing to clear the approaches to Antwerp before the Germans could establish themselves at the mouth of the Scheldt, with the result that the Allies were unable to use the port until 28 November. Montgomery was also blamed for the failure of the British First Airborne Division to

¹⁶⁶ Chester Wilmot, *The Struggle for Europe* (London: Collins, 1952), p. 476.

capture the bridge across the Rhine at Arnhem in September.¹⁶⁷ The Allies' logistical problems would have made victory in 1944 difficult in any case. The Germans still had sufficient forces to launch a counter-attack in the Ardennes in December 1944, and the final Allied advance across Germany did not begin until February 1945.

Meanwhile, there had been successful interactions between Allied air and land forces. As already noted, the air forces had greatly impeded the German army's mobility by attacking its communications in France. From the autumn, strategic and tactical bombers extended the attack to transport systems in Germany itself, helping to paralyse the German economy. Alfred Mierzejewski has argued that German industry was dependent upon distribution of coal by rail and inland waterways and that the bombing of railway marshalling yards in particular reduced armaments production by more than half between June 1944 and February 1945.¹⁶⁸ Moreover, by 1944 the USAAF and Bomber Command had at last acquired the technical means and the experience with which to make effective attacks on oil targets. The USAAF began to do so in May 1944, and Bomber Command in June. German stocks of aviation fuel, petrol and diesel oil had been increasing down to May, but in May total fuel production fell to 85 per cent of that of April, and in June to 50 per cent. The invasion of Normandy and the Soviet offensive in White Russia in June forced the Germans to increase consumption of fuel just as strategic bombing was reducing production. The Russians captured the Romanian oilfields in August. With fuel in short supply, the *Luftwaffe* found by November that it could no longer use the large numbers of fighter aircraft being produced in Germany, or train pilots to fly them. The strategic air offensive also benefited from the advance of the Allied armies, which deprived the *Luftwaffe* of radar early warning systems in France and Belgium. This gain was particularly marked in the case of Bomber Command, which had been suffering unsustainable losses from German night-fighters prior to its diversion to operations over France in support of D-Day. The German night-fighter force was largely ineffective after August. On the other hand, the Allied armies benefited from the fact that by 1944 about 2 million German soldiers and civilians were engaged in ground anti-aircraft defence, and that 30 per cent of total German artillery production was for the anti-aircraft defences, including 70 per cent of 88-mm guns which otherwise would

¹⁶⁷ G. E. Patrick Murray, *Eisenhower versus Montgomery: The Continuing Debate* (Westport, Conn.: Praeger, 1996), chs. 1–4.

¹⁶⁸ Alfred C. Mierzejewski, *The Collapse of the German War Economy, 1944–1945* (Chapel Hill: University of North Carolina Press, 1988), esp. p. 198.

have been employed in the anti-tank role.¹⁶⁹ The last twelve months of the war thus saw a successful combination of air and land power, quite different from earlier Air Staff ideas of the RAF as an independent instrument of war. After the war, the British Bombing Survey Unit concluded that the attempt to break the morale of the German civilian population had clearly failed.¹⁷⁰

Britain's resources were so fully stretched that her contribution to victory over Japan was necessarily limited. The Allied objective in Burma in 1944–5 was to reopen links with China, where the greater part of the Japanese army was engaged, and from where American strategic bombers could attack Japan. American and Chinese forces operated in northern Burma, securing airfields and clearing the one good road from Burma to China. The main British effort was to recover central Burma, and then to seize the country's only sizeable port, Rangoon. General Sir William Slim's 14th Army, which included African as well as British and Indian divisions, began operations in October 1944, as the monsoon tailed off. Mandalay fell on 20 March, and Rangoon on 3 May, 1945, after a seaborne landing. The campaign was a brilliant success, but played little part in the defeat of Japan. Likewise the creation of a British Pacific Fleet in December 1944 was essentially a political gesture as by that date the US Navy had gained decisive superiority over the Japanese.¹⁷¹

Japan had already been brought to the brink of surrender by blockade and conventional air attacks by the time that atomic bombs were dropped on Hiroshima and Nagasaki on 6 and 9 August 1945. The Quebec agreement of August 1943 had stated that the United States and the United Kingdom would not use an atomic bomb without the other's consent, and British consent had been given on 4 July 1945, twelve days before the first test bomb was exploded at Los Alamos in New Mexico. Churchill never doubted that President Truman's decision to use the atomic bomb was right.¹⁷² The British decision to make an atomic bomb went back to the end of August 1941, when British scientists had concluded that there was a reasonable chance that one could be produced before the end of the war, and the Chiefs of Staff had recommended maximum priority. There had been a fear that the Germans might make one first. The Americans had also been active in the

¹⁶⁹ Murray, *Luftwaffe*, pp. 245–50, 264–5; Overly, *Air War*, p. 122; Webster and Frankland, *Strategic Air Offensive*, vol. III, pp. 123–40, 225–61; Wilson, *Churchill and the Prof*, pp. 81–8.

¹⁷⁰ Biddle, 'British and American approaches', pp. 126–7.

¹⁷¹ Jon Robb-Webb, '“Light two lanterns, the British are coming by sea”: Royal Navy participation in the Pacific 1944–45', in Greg Kennedy (ed.), *British Naval Strategy East of Suez, 1900–2000* (London: Frank Cass, 2005), pp. 128–53.

¹⁷² Churchill, *Second World War*, vol. VI, p. 553.

field, and in October 1941, while the United States was still neutral, Roosevelt had suggested that the British and American efforts might usefully be co-ordinated or even jointly conducted. Churchill's initial response had been non-committal. However, by July 1942 Anderson, the lord president, who had oversight of atomic research, realised that the effort required to produce atomic bombs was beyond what Britain could achieve in war-time, and recommended that the two countries' research programmes should be merged.¹⁷³ Subsequently the British scientists concerned moved to the United States, and Canada provided the raw material, uranium. Nevertheless, most of the scientific and industrial input to what was called the Manhattan Project was American, and it was the United States that emerged from the Second World War as the first nuclear power.

Summary

Britain was by no means as backward in her capacity to wage war as critics such as Barnett have made out. While one can point to shortcomings, the overall impression is one of a formidable military-scientific-industrial complex. Nor were servicemen conservative either in their requirements for new weapons systems or in the doctrines for their use. The quality of British arms varied but most matched the best that Germany could produce, and some, for example strategic bombers, were better. There were failures, notably unreliable tanks, but failures tended to be the result of trying to do too much too quickly, and the improvement of British tanks by 1945 deserves as much attention as earlier defects.

Britain began the war intending to conserve her economic strength for a three-year war, but had to throw caution to the winds from the summer of 1940. British strategy aimed to make the United Kingdom and its trade routes secure, to protect overseas territories and interests, to support allies, and to win a long war in which the enemy would first be weakened by blockade and air attack before a decisive offensive could be mounted on land. The strategy could be said to have been successful eventually, but there were many unexpected events on the way. It had always been realised that Britain could not make her empire secure against both Italy and Japan if she were engaged in a war with Germany. Even so, Malaya could have been defended more effectively if Churchill

¹⁷³ The Roosevelt–Churchill correspondence in 1941, and Sir John Anderson's letter to Churchill, 30 July 1942, recommending a merger with the Americans, are in PREM 3/139/8A, TNA.

had allowed the Chiefs of Staff's plan for air defence to be implemented. In the event, as the Norwegian campaign and the battle for Crete had already demonstrated, sea power had to be supplemented by air power. The defence of the United Kingdom itself depended upon Fighter Command and, whatever criticisms may be made about neglect of imperial defence before or during the war, events in 1940 showed the wisdom of conforming to the strategic principle of first securing one's base.

Belief in the effectiveness of blockade tended to be exaggerated, but did not involve the creation of additional naval forces, since command of the sea was necessary in any case to protect trade. The Air Staff's faith in the strategic bomber, however, did involve substantial opportunity cost in terms of trade defence and tactical air power. Moreover, the RAF failed to develop effective strategic bombers and the technical means of hitting vital targets such as oil plants and transport systems until late in the war. The Air Staff's strategy also proved to be beyond Britain's industrial strength, which could never have supported a 4,000-strong heavy bomber force without weakening the defence of her trade routes and overseas interests even more than was the case.

Britain's ability to conduct a long war was compromised by the fall of France, and proved to be possible only with the support of Lend-Lease. It was also the United States that provided about two-thirds of the air and land forces used to defeat Germany in the west in 1944–5. The Red Army absorbed the efforts of the greater part of the German army from 1941. Given the scale of the effort required for victory in 1945, it would seem that the long-term strategy worked out by the Chiefs of Staff in the autumn of 1940 for weakening Germany by blockade and bombing, prior to landing British land forces in support of popular revolts in occupied Europe, was beyond Britain's unaided strength. Britain could not realistically have mobilised more manpower than she did, and indeed it was the manpower budget of 1942 that imposed a reality check on Churchill's directives requiring more heavy bombers and more army divisions than could be provided.

Nevertheless, Britain's contribution to the Allied victory was considerable. She was the only great power to be engaged against Germany from September 1939 to May 1945. She made the main contribution to Allied sea power in the Atlantic, the Mediterranean and the Indian Ocean. She also built up a larger air force than Germany. The British and Commonwealth armies played the leading role in the Middle East and a strong supporting role in North-West Europe. Yet events showed that Britain could not stand alone in a great war, militarily, economically or in the scientific-industrial effort to maintain the full range of weapons systems, which, by July 1945, included the atomic bomb.

5 The impacts of the atomic bomb and the Cold War, 1945–1954

Introduction

For the purposes of military technology, the post-war period may be divided into an atomic phase and a thermonuclear phase, the latter beginning with the Americans' first hydrogen-bomb tests in 1954. This chapter deals with the first phase. As international relations came gradually to be dominated by the Cold War, British foreign policy aimed to co-operate with what Churchill in 1948 called three overlapping circles of 'free nations': the United States, the Commonwealth and Western Europe.¹ Anglo-American relations were the most important for three reasons. First, Britain had merged her atomic research with America's in 1942 and had hopes of collaboration in the post-war period. Second, Britain had to borrow dollars to finance imports from North America while converting her industries from war to peace, and she hoped to co-operate with the United States in creating a stable and expanding international economy. Third, only the United States could counter-balance the power of the Soviet Union.

In analysing defence policy after 1945 one has to remember that the course of international relations was not predictable. An important Foreign Office brief for the Potsdam conference in July 1945 recommended that Britain should stand firm diplomatically against Soviet designs, but did not assume that American support would be forthcoming, and concluded that Britain must base its foreign policy on the principle of co-operation between the United States, the Soviet Union and the British Commonwealth.² By May 1946 the Foreign Secretary, Ernest Bevin, could tell the Cabinet and Commonwealth prime ministers that the danger from the Soviet Union had become as great,

¹ *The Times*, 11 Oct. 1948.

² Sir Orme Sargent, 'Stocktaking after VE Day', 11 July 1945, reprinted in *Documents on British Policy Overseas (DBPO)*, series 1, vol. I (London: HMSO, 1984), pp. 181–7. Sargent became permanent under-secretary in 1946.

and possibly greater, than that of a revived Germany, but the threat was one of subversion not outright war. Bevin skilfully exploited American fears of Communism as a means of reducing Britain's commitments at a time when the British economy was under strain. On 21 February 1947 he announced that Britain could no longer afford to give aid to Greece, where Communist guerrillas were active, or Turkey, thereby prompting the American President to announce the 'Truman doctrine' of supporting 'free peoples' who were resisting armed minorities or outside pressures.³ However, it was not until after the Communist takeover of Czechoslovakia in February 1948 that Labour ministers were convinced about Soviet hostility. The US State Department made plain that any American commitment to the defence of Western Europe would depend on evidence that the Europeans were willing to help themselves. To this end Bevin signed the Brussels Treaty with France and the Benelux countries in March 1948, creating the Western European Union (WEU), with its obligation to assist any member that was attacked, and the North Atlantic Treaty followed on 4 April 1949.⁴ It was the invasion of South Korea by the Communist North on 25 June 1950 that turned NATO from a mutual defence pact into a tight military alliance, since it was believed in Washington and London that the war might be a curtain-raiser for Soviet aggression in Europe within the next few years. The Labour government's response was to embark on an over-ambitious rearmament programme that Churchill had to cut back after he returned to office during a sterling crisis in October 1951.

The issues to be addressed in this chapter are: in what sense did the Labour government's decision to develop a British atomic bomb mark the beginning of a nuclear phase in the British way of warfare? Was Britain's defence policy in the immediate post-war period commensurate with her economic resources? Of particular significance in this respect was the Chiefs of Staff's Global Strategy paper of 1952, which was described by a leading American expert in strategic studies, Richard Rosecrance, as 'undoubtedly the most influential British defense paper of the post-war period', and by Eric Grove as 'perhaps one of the most remarkable attempts of its kind to rethink national strategy from first principles'.⁵ John Baylis and Alan Macmillan questioned the extent to

³ Alan Bullock, *Ernest Bevin: Foreign Secretary* (London: Heinemann, 1983), pp. 266, 368–70, 378–9.

⁴ John Baylis, *The Diplomacy of Pragmatism: Britain and the Formation of NATO, 1942–1949* (Basingstoke: Macmillan, 1993), pp. 68–73, 92–111.

⁵ R. N. Rosecrance, *Defense of the Realm: British Strategy in the Nuclear Epoch* (New York: Columbia University Press, 1968), p. 159; Eric Grove, *Vanguard to Trident: British Naval Policy since World War II* (Annapolis, Md: Naval Institute Press, 1987), p. 82.

which the paper broke new ground but nevertheless considered that it 'set the foundations of declaratory British strategic policy for many years to come'.⁶ Briefly, the Global Strategy paper recognised that too much expenditure on defence by Britain and her allies would undermine their economies and present the Communists with a bloodless victory. Moreover, the Cold War was expected to continue for a long period during which equipment would become obsolescent, making high levels of expenditure on research and development necessary to keep abreast of the Soviet forces. However, 'a new factor of fundamental importance' was that studies in 1951–2 had shown that there would be no effective defence in the foreseeable future against an atomic air attack, either against the United Kingdom or the Soviet Union. A strategy of nuclear deterrence therefore offered security at a sustainable cost.⁷ The Global Strategy paper brings out starkly the interconnection between technology, economics and strategy, and forms the main focus of this chapter.

Polymakers

Although central to the future of defence policy, atomic energy was rarely on the Cabinet agenda, even for report. In 1945 and 1946 the Prime Minister, Attlee, consulted his inner Cabinet: Bevin, Herbert Morrison (lord president of the council) and Cripps (president of the Board of Trade), and two or three others in an *ad hoc* ministerial committee, known as Gen 75, the papers of which were not circulated to the rest of the Cabinet. Initially, recommendations on atomic policy were made by an Advisory Committee, which included service, scientific and official members, and was chaired by Sir John Anderson, who had been in charge of the atomic energy programme during the war. A complicating factor was that Anderson was Independent MP for the Scottish universities and sat on the Opposition front bench. He was very much involved in policymaking for about a year but thereafter the disadvantage that he did not attend ministerial meetings led to the creation of a new standing committee, the Atomic Energy Official Committee, which largely superseded Anderson's committee. The decision to make a British atomic bomb was not taken formally until January 1947, and then by an *ad hoc* ministerial committee, known as Gen 163. Bevin and Morrison were again members, along with the Secretary of State for the Dominions, the Minister of Defence and the Minister of Supply. The

⁶ John Baylis and Alan Macmillan, 'The British Global Strategy paper of 1952', *Journal of Strategic Studies*, 16 (1993), no. 2, 200–26, at 221.

⁷ 'Defence policy and global strategy', D (52) 26, CAB 131/12, TNA.

Cabinet's Defence Committee was not kept regularly informed of the atomic programme and was not asked to take a decision on it until 1950, and then only because the Chiefs of Staff had recommended some delay in the interests of accelerating other weapons projects.⁸ It was not, of course, unprecedented for a prime minister to reserve sensitive defence matters to himself and an inner circle of ministers and advisers. Churchill had excluded the Cabinet from important discussions on the atomic bomb, and much else, during the war.

Attlee did not long follow Churchill's example of being his own minister of defence. His experience as under-secretary of state for war in 1924 had led him to believe that there should be a single defence doctrine, not one for each service, and in 1936 he had proposed that there should be a minister of defence with authority to establish priorities and allocate resources between the three services.⁹ Nevertheless the changes outlined in the 1946 White Paper *Statement Relating to Defence* were hardly revolutionary. Drawing upon war-time and pre-war experience, an informal group including General Ismay, Churchill's war-time chief of staff, General Sir Ian Jacob, Ismay's chief staff officer during the war, and Sir Edward Bridges, the Cabinet secretary, had recommended that the three independent service departments retain responsibility for plans and operations, with co-ordination through numerous inter-service committees. The minister of defence, advised by the Chiefs of Staff, was to decide the balance of resources going to each department before the estimates were sent to the Treasury, but in practice it was difficult for him to do so if the Chiefs of Staff could not agree where cuts necessary to bring defence expenditure within its budget were to be found. The possibility of a powerful chairman of the Chiefs of Staff Committee giving independent, inter-service advice had been considered and rejected, and a chief of the defence staff was not appointed until 1959.¹⁰ The Treasury, therefore, continued to have an active role in discussions on defence policy from the point of view of securing economies. The minister of defence represented all three services in Cabinet, and was the prime minister's deputy on the Defence Committee, but neither of the ministers of defence who held office between December 1946 and October 1951, A. V. Alexander and Emmanuel Shinwell, was a leading member of the government. The Chiefs of Staff enjoyed considerable

⁸ Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy*, 2 vols. (London: Macmillan, 1974), vol. I, pp. 19–31, 231.

⁹ 308 HC Deb., 5s, 1936, cc. 1317–21.

¹⁰ Franklyn A. Johnson, *Defence by Ministry: The British Ministry of Defence 1944–1974* (New York: Holmes and Meir Publishers, 1980), pp. 17–28; Peden, *Treasury and British Public Policy*, pp. 420–1.

autonomy, being individuals of considerable prestige, including Viscount Montgomery of Alamein, the CIGS from 1946 to 1948; his successor, Slim, the victor in Burma; and two exceptionally able CASs, Tedder (1946–50) and Slessor (1950–3). The first sea lords had the confidence that came from representing the senior service. Defence policy was still very much the product of compromise between independent departments.

Labour ministers inherited many war-time controls over the economy, and spoke a lot about economic planning, but few – perhaps only Cripps and Hugh Gaitskell – had a clear idea of how planning defence production might be related to the wider economy. As it happened, Cripps was chancellor of the exchequer from November 1947 to October 1950, when he was succeeded by Gaitskell, and the Treasury became the focus of economic planning. At first ministers seem to have thought in terms of manpower planning, as in the war, but without the political will to direct labour into munitions or other key economic activities, such as agriculture or exports, manpower planning could only reveal the extent of shortages.¹¹ When rearmament began in 1950 raw materials were in short supply, and a Ministry of Materials was created in 1951 with a view to making allocations, but it was not easy to disentangle its responsibilities from those of the Board of Trade for industry or of the Ministry of Supply for munitions, aviation and atomic energy. By 1952 the raw materials shortage was abating and a Conservative government that did not share Labour's commitment to planning was in office. The only surprising thing is that it was not until 1954 that the Ministry of Materials was abolished.

Churchill kept the existing arrangements for the Ministry of Defence and the defence departments, but held the portfolio of minister of defence himself until 28 February 1952. As his successor, he appointed the distinguished soldier, Earl Alexander of Tunis, who, however, made no attempt to exert his own authority, leaving the service ministers to run their departments, while the Prime Minister retained effective control of defence policy. Churchill was a month short of his seventy-seventh birthday when he took office, and was in indifferent health. He was interested in the new strategic problems posed by the atomic bomb but, in the words of the official historian, Margaret Gowing, 'for the most part [his] minutes on atomic energy in the months after his return to office show the deterioration of his powers'.¹² Churchill continued to

¹¹ Alec Cairncross, *Years of Recovery: British Economic Policy 1945–51* (London: Methuen, 1985), pp. 299–314, 384–99.

¹² Gowing, *Independence and Deterrence*, vol. I, p. 407.

rely a great deal on Cherwell for guidance on scientific and other technical questions. Cherwell was an enthusiastic supporter of an independent nuclear deterrent, but he was also determined that the aggregate level of defence expenditure should not exceed what the economy would bear.

Atomic weapons¹³

The atomic bomb was one of the first problems that Attlee had to deal with on taking office on 26 July 1945. In the wake of the destruction of Hiroshima and Nagasaki, he raised with President Truman on 25 September the question of how international relations could be changed to ensure that mutual annihilation would not result from this new weapon. However, relations between the United States and the Soviet Union made it unlikely that Washington would agree to share technical information through the United Nations Atomic Energy Commission. British hopes of bilateral collaboration rested initially on the Hyde Park *Aide-Mémoire*, signed by Churchill and Roosevelt in September 1944, which had promised post-war collaboration in atomic research for military and commercial purposes, unless terminated by mutual agreement. However, the Truman administration did not consider itself bound by the *Aide-Mémoire*, which was not a formal diplomatic document, and although on 15 November 1945 Truman signed another informal declaration that there would be 'full and effective co-operation in the field of atomic energy' between the United States, the United Kingdom and Canada, there was little exchange of scientific information after the war even before the McMahon Act of 1 August 1946 formally terminated collaboration. Moreover, the Quebec Agreement, whereby the United States and the United Kingdom would not use the atomic bomb without each other's consent, was replaced on 16 November 1945 by the Groves-Anderson memorandum, whereby the United States, the United Kingdom and Canada agreed that they would not use atomic weapons against other countries without *prior consultation* with each

¹³ It is worth mentioning that research was undertaken in this period on weapons of mass destruction other than the atomic bomb. The 1952 Global Strategy paper noted that 'research in Bacteriological Warfare has not yet gone far enough to enable us to decide whether or not it would be advantageous to the Allies to use it. The new nerve gases can, however, be used tactically to great advantage and would provide the Allies with weapons of real value against an enemy who relies on massed formations. The moral objections to Chemical Warfare can surely be no greater than to atomic warfare . . . We consider that the Allies should be prepared to use these weapons in war if they consider it advantageous to do so.' (D (52) 26, CAB 131/12, TNA).

other.¹⁴ The change from Britain having a veto, at least in principle, to only having the right to be consulted was indicative of the extent to which Britain had been marginalised in Washington's world view.

The atomic bomb was rightly regarded as a fearful weapon. The United States Strategic Bombing Survey estimated the casualties at Hiroshima at between 70,000 and 80,000 dead and about as many injured. Comparable casualties had been inflicted by conventional weapons: about 84,000 people were killed and 41,000 wounded in the Tokyo fire-raid of 9–10 March 1945, when fires started by 334 USAAF bombers using incendiary bombs were spread by a strong wind.¹⁵ However, the atomic bomb enabled one aircraft to wreak destruction on a scale that had previously required hundreds, and there were also the uncertain after-effects of radiation. A British mission of scientists sent to Japan to study the effects of the atomic bomb concluded that the standard figure in British conditions would be approximately 50,000 dead.¹⁶ In July 1946 the Joint Technical Warfare Committee of the Chiefs of Staff estimated that between 30 and 120 atomic bombs, accurately targeted, would knock out the United Kingdom.¹⁷ In June 1952 the Chief Scientific Officer at the Home Office advised that, outside the area of complete devastation within half to three-quarters of a mile from where an atomic bomb fell, it should be possible to take civil defence measures to deal with fires and to rescue trapped casualties, and that shelters could provide protection for the public.¹⁸ However, the Chiefs of Staff Global Strategy paper advised the same month that, given that there was no effective defence against atomic attack, civil defence should be restricted to preparations needed to carry out essential activities in London and the chief ports during an attack, and that there should be no policy of building shelters for the general population.¹⁹

The United States' monopoly of the atomic bomb did not last for long. Aided by information gained by the naturalised British scientist, Klaus Fuchs, who had worked on the Manhattan Project, the Soviets tested their first atomic bomb in August 1949, earlier than expected.²⁰

¹⁴ Gowing, *Independence and Deterrence*, vol. I, pp. 6–7, 21, 65–7, 75–88, 92–111. The declaration of 15 November and the Groves–Anderson memorandum are reproduced in *DBPO*, series I, vol. II (1985), pp. 618–20, 630–2.

¹⁵ Craven and Cate (eds.), *Army Air Forces in World War II*, vol. V, pp. 614–17, 722.

¹⁶ British Mission to Japan, *The Effects of the Atomic Bombs at Hiroshima and Nagasaki* (London: HMSO, 1946).

¹⁷ Gowing, *Independence and Deterrence*, vol. I, pp. 174–5.

¹⁸ David Maxwell Fyfe (home secretary) to Prime Minister, 4 June 1952, and enclosure, PREM 11/294, TNA.

¹⁹ D (52) 26, para. 105, CAB 131/12, TNA.

²⁰ David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy* (New Haven: Yale University Press, 1994), pp. 83, 104–8, 138, 222–3. British estimates of the date

The British had proceeded less expeditiously. The Chiefs of Staff advised in October 1945 that the best defence against atomic bombs was likely to be the deterrent effect that the possession of the means of retaliation would have on a potential aggressor, and in January 1946 they said that a stock in the order of hundreds rather than scores would be necessary to deter a country with widely dispersed industries and population (like the Soviet Union). In December 1945, ministers in the Gen 75 committee approved the construction of the first reactor capable of producing plutonium, and in August 1946 the CAS sent the first requisition for an atomic bomb to the Ministry of Supply.²¹ The McMahon Act was amended in October 1950 to allow rather more co-operation between American and British scientists but the first British test did not take place until 3 October 1952, in the hold of a ship off Australia. The first test of a British atomic bomb dropped by an aircraft did not occur until 11 October 1956.

Until then the only atomic bombs that could be used to deter Soviet aggression were under the control of the Americans, including those equipping USAF bombers based in Britain since July 1948. It was realised in Whitehall that acceptance of the bombers was necessary in order to keep the United States firmly committed to the defence of Western Europe, but there was concern about the lack of clarity about prior consultation about the use of atomic bombs by aircraft based in Britain. The matter was raised on a number of occasions between 1950 and 1952, but the American view was that, constitutionally, there could be no restraint on the President's power to use atomic weapons if he believed that they were necessary for the defence of the United States. Britain was thus likely to be a target, if not the prime target, for Soviet forces; yet she could not rely on American forces to strike at targets that were of most concern to her, such as air and naval bases from which Soviet attacks might be launched.²² This situation led to successive British governments and their service advisers to seek not so much an independent deterrent, as an interdependent deterrent by means of which Britain would have some influence on American strategy.

The effort required to make a British atomic bomb had an opportunity cost in terms of the development of other weapons systems. Tizard,

by which the Soviet Union would have an atomic bomb varied from mid-1950 to 1957 (see Gowing, *Independence and Deterrence*, vol. I, p. 222).

²¹ Gowing, *Independence and Deterrence*, vol. I, pp. 164, 168–9, 174; Humphrey Wynn, *The RAF Strategic Nuclear Deterrent Forces: Their Origins, Roles and Deployment 1946–1969* (London: HMSO, 1994), pp. 9–10, 18.

²² Simon Duke, *US Defence Bases in the United Kingdom: A Matter for Joint Decision?* (Basingstoke: Macmillan, 1987), pp. 50, 55–6, 59–85.

the chief scientific adviser to the Ministry of Defence, pointed out in February 1949 that, as more and more of the country's resources for research went into atomic energy, other projects would suffer. The Defence Research Policy Committee, of which he was chairman, drew attention to the possibility that Britain might have atomic bombs before she had the aircraft required to use them, and to the need to develop guided missiles for effective air defence. Following the first Soviet nuclear test, Tizard came to the conclusion that it was a mistake for Britain to develop her own atomic weapons; she should, instead, rely on the Americans for strategic bombing and focus her own efforts on measures for the defence of the United Kingdom and for preventing the Soviet forces from securing bases west of the Rhine. His ideas had a good deal of support in the Ministry of Defence, but not from the Chiefs of Staff. The furthest the Chiefs went was to recommend in April 1950 that higher priority be given to research on guided missiles, electronics for warships, tactical aircraft and anti-tank defence than to atomic energy. In the event ministers did not take the advice, but they gave guided missiles joint priority with the atomic programme.²³

Air weapons

Strategic bombers in squadron service in the late 1940s were still piston-engined machines, vulnerable to interception by jet fighters. The Soviet air force lacked an effective long-range heavy bomber of indigenous design when the war ended. However, three Boeing B-29s – the type used to drop atomic bombs on Japan – had landed in Soviet territory in 1944 and the Russian designer A. N. Tupolev adapted the American aircraft to Soviet production methods. Designated Tu-4, these bombers first entered service in 1947, and by 1953 the Soviet air force had 1,000 of them. The first production Soviet medium bomber powered by jet engines, the Tu-16, did not begin to enter service until 1954.²⁴ The response of the RAF to the threat posed by the Tu-4 was to equip fighter squadrons with the jet fighters that were available in 1947–8. All piston-engined fighters, even those that had entered service at the end of the war, had been replaced by 1951, representing a high rate of obsolescence. Another response, already noted, was to give the highest priority

²³ Gowing, *Independence and Deterrence*, vol. I, pp.202, 225–33. For need for new government approach to management of science and technology, see Stephen Twigge, *The Early Development of Guided Weapons in the United Kingdom, 1940–1960* (Chur, Switzerland: Harwood Academic, 1993), ch. 5.

²⁴ William Green, 'Russia's strategic bombing arm', *RAF Flying Review*, 13 (June 1958), 29–30.

in 1950 to the development of guided missiles, but no British surface-to-air missile was ready for service until 1958.

The Lancaster heavy bombers and Mosquito light bombers with which Bomber Command was equipped in 1945 were designed for war against Germany and lacked the range to reach targets in the Soviet Union. The Lincoln heavy bomber, deliveries of which were beginning as the war ended, was a slight improvement in this respect, but it was decided to equip some Bomber Command squadrons with longer-range American B-29s from March 1950. There were problems in securing spare parts for the RAF's B-29s, most of which were unserviceable by the autumn of 1953, and the type was withdrawn from squadrons in the spring of 1954, over a year before the Lincoln.²⁵

Bomber Command received its first jet aircraft, the English Electric Canberra light bomber, in May 1951, six years after the Air Ministry had issued the specification, and a year after the Russians had put their first jet light bomber into service. At this stage the Canberra carried only conventional bombs. A ballistic missile was considered as a means of delivering atomic bombs, but tests showed that the only large rocket in existence, the German V2, had a maximum payload of only 2,150 pounds, whereas the bomb used at Hiroshima had weighed 9,000 pounds. The Air Ministry therefore issued specification B.35/46 on 1 January 1947 for a strategic bomber capable of carrying a 10,000-pound bomb 3,350 miles and able to fly high enough to evade an enemy's defences. It was not, however, expected that such an advanced aircraft would be in service for about ten years. An interim strategic jet bomber, the Vickers Valiant, which first flew in 1951, was adopted, but it did not enter service until 1955, only one year before the first of the more advanced designs.²⁶

The pace of aircraft development was such that even Fighter Command was confronted with a serious problem of obsolescence in 1950. The RAF's jet fighters in service at that date, the Gloster Meteor and the de Havilland Vampire, had straight wings, which were aerodynamically less efficient than swept-back ones. The earliest versions of the Meteor and Vampire had entered service in 1944 and 1946 respectively, but plans for their replacement were related to an assumption that a major war would be unlikely to occur until about 1957. Resources for research and development had been drastically reduced at the end of the war and it was decided to take a risk in concentrating on really big advances in

²⁵ Lord De Lisle and Dudley (secretary of state for air) to Prime Minister, 28 Oct. 1953, PREM 11/371, TNA.

²⁶ Andrew Brookes, *V Force: The History of Britain's Airborne Deterrent* (London: Jane's Publishing Company, 1982), pp. 13, 21–32.

aerodynamic design and engines, with a view to having a commanding lead by the mid-1950s. Accordingly, the Hawker fighter to meet the Air Ministry specification F.3/48 was not intended to be introduced into service until 1953/4, and the prototype did not fly until July 1951. It was known by May 1950 that the Soviet air force had jet fighters with swept-back wings, but it was the appearance of the MiG-15 jet fighter over Korea that shocked the Air Staff into looking for ways in which to accelerate the replacement of the Meteor and Vampire. The CAS, Slessor, advised the Chiefs of Staff Committee in September 1950 that the MiG-15 was faster than any British fighter in production and that the situation regarding both Fighter Command and the 2nd Tactical Air Force in Germany was serious. The Russians had established a four-year lead over the British in fighter development; ironically, the MiG-15 was powered by a copy of the Rolls-Royce Nene jet engine that had been exported to the Soviet Union in 1947.²⁷

One way in which to bring the RAF's fighter squadrons up to date was to adopt the North American F-86 Sabre, which had swept-back wings and which, Slessor noted, had outclassed the MiG-15 in Korea. Canada was producing the Sabre under licence but in September 1950 he did not recommend adopting it unless there was no other way to meet RAF requirements. There were disadvantages, he thought, in adopting an interim fighter, and there would be difficulty in financing the purchase in dollars. By November dollar aid was available from Canada for Canadian-produced Sabres, which eventually saw service with the RAF from 1953 to 1956.²⁸

Meanwhile, in September 1950, the Air Staff had decided to speed up the development of British swept-wing fighters by every possible means, including placing orders for aircraft that had not yet flown. Slessor predicted, accurately enough, that the Hawker F3 (later known as the Hunter) would be superior in speed and fire-power to the MiG-15. However, deliveries of the Hunter fell badly behind in 1953 and, although they were back on schedule by the end of 1954, there was a problem with its armament, the firing of the guns interfering with the flow of air into the engine, causing it to stall at high altitudes, and modifications were required in the design. As a second string to the Hunter, the Ministry of

²⁷ 'Soviet interceptor fighter development', note by the Chief of Air Staff, COS (50) 357, 13 Sep. 1950; Minister of Defence to Prime Minister, 17 Nov. 1950; Minister of Supply to Prime Minister, 22 Nov. 1950, PREM 8/1357, TNA. This file also contains a report, dated 16 May 1950, by the Joint Intelligence Bureau on production of Russian aircraft, including jet fighters with swept-back wings and twin-jet bombers.

²⁸ COS (50) 357, and 'Production of jet aircraft', Gen 344, 1st meeting, 23 Nov. 1950, PREM 8/1357, TNA.

Supply also ordered the Supermarine Swift, which was based on a research aircraft and was believed in 1950 to be slightly further ahead in development, although in the event the prototype did not fly until August 1951, a month after the Hunter. Much worse, the Swift proved to be aerodynamically unsatisfactory and had to be withdrawn from service after having been issued to one squadron in 1954. The government made no attempt to conceal its disappointment at the delays which had occurred and, in the case of the Swift, the failure of the aircraft in its designed role as a high-altitude interceptor. Decisions to place orders for hundreds of the Hunter and Swift prior to their first test flights seemed to be justified at the time, as tooling up was required for early mass production, but early production Hunters were of limited value until they had been modified. Most of the Swifts that were built turned out to be worthless, and later production models were employed only in the restricted role of medium-altitude fighter-reconnaissance.²⁹

British aircraft development was out of step with the rapidly changing Cold War. Nevertheless, some British designs were competitive on international markets. The Meteor, Vampire and Canberra were widely exported; the Vampire was produced under licence in France, Switzerland and India; and the Canberra was adopted by the USAF and produced under licence by the Martin company. The problem was that the pace of technical change was so great that Britain could not afford to produce a new type of fighter or bomber to match every new development in the United States or the Soviet Union. The solution of using American designs, the B-29 and the Sabre, as interim aircraft while exporting successful British aircraft was sensible and foreshadowed greater international technological interdependence.

The FAA had been particularly reliant upon American aircraft during the war, but once Lend-Lease was terminated, spare parts had to be paid for in scarce dollars. Consequently all American aircraft had been removed from first-line service by August 1946. Their British replacements were all, for various reasons, unsuitable for the navy's aircraft carriers. Some aircraft were too wide and heavy for the lifts, some were too high for hangars, some had high landing speeds and some had poor handling qualities. As Eric Grove has remarked, the immediate post-war period was 'perhaps the all-time low point of naval aviation'.³⁰ On the

²⁹ 'Soviet interceptor fighter development', note by Chief of Air Staff, COS (50) 357, 13 Sep. 1950, PREM 8/1357, TNA; 535 HC Deb., 5s, 1954-55, cc. 2749-51; Ministry of Supply and Ministry of Defence, *The Supply of Military Aircraft* (Cmd 9388), PP 1954-55, x. 511-22; Select Committee on Estimates, *The Supply of Military Aircraft*, PP 1956-57, v. 351-702, at paras. 39-45.

³⁰ Grove, *Vanguard to Trident*, p. 17.

other hand, the FAA was a pioneer of carrier-borne jet aircraft: the Sea Vampire was an adaptation of the land-based fighter, and the Supermarine Attacker was an entirely new aircraft that entered service in fighter and fighter-bomber versions in 1951. More advanced types which followed passed the test of being exportable: the Hawker Sea Hawk, which began to replace the Attacker in 1953, was later ordered by the German navy, and the Sea Venom, which was the navy's first jet night and all-weather fighter when it entered service in 1954, was built under licence in France as well as being adopted by the Australian navy. Once more, the story is one of periodicity in successful aircraft, as Britain's limited research and development resources could not sustain a steady flow of advanced designs.

Naval weapons

The navy had a very large building programme at the end of the war. Under construction, on order, or projected in October 1945 were three battleships, seven fleet carriers, seventeen light fleet carriers, eleven cruisers, ninety destroyers, thirty-four submarines and thirty-four escort vessels. In December 1944 Cherwell, as scientific adviser to the prime minister, had argued unsuccessfully for the replacement of the battleship by the aircraft carrier and land-based strike aircraft, pointing to the Germans' development of guided bombs (which had sunk an Italian battleship on its way to surrender in 1943). The Admiralty, however, still believed that the battleship was 'the basis of strength of the fleet'. Two 'Lion'-class battleships, which had been cancelled earlier in the war, were reordered, to be added to HMS *Vanguard*, construction of which had proceeded slowly during the war. With peace came retrenchment and the 'Lions' were finally cancelled in October 1945.³¹ *Vanguard* was completed in April 1946, the largest warship ever built in Britain at 44,500 tons, and costing £9 million, exclusive of guns and mountings, which had been taken from reserve stock. It was simply not possible to afford more such ships in post-war budgets. Manpower shortages also meant that *Vanguard* rarely had a full crew. Nevertheless, continued faith in the battleship was indicated by the retention of the four surviving 'King George Vs' in reserve. It would be easy to denounce such conservative attachment to an outmoded category of warship, were it not for the fact that other navies, including those of the United States, the Soviet Union, France and Italy, as well as some minor naval powers, also retained battleships into the 1950s. Nor were

³¹ Ibid., pp. 8, 10–11.

Admiralty views on future battleship design unduly conservative: an Admiralty paper for the Cabinet in July 1945 stated that it was likely that the 'battleship' of the future would bear little resemblance to capital ships of the Second World War; for example, if the rocket replaced the gun it might be possible to build a smaller ship to fulfil the function of destroying the most powerful surface ships of the enemy.³²

Aircraft carriers were in reality the most powerful ships, whether for attacking enemy vessels or bases, or for protecting convoys from air and submarine attack. Fleet carriers capable of operating the most advanced aircraft were intended to be able to operate against land-based aircraft. Light fleet carriers, with low-performance aircraft, would operate mainly in the Atlantic. In practice, until piston-engined aircraft were replaced by jets, the light fleet carriers, which were economical in manpower, were widely used, including in active service in the Korean War. The first of the post-war fleet carriers, *Eagle*, was operational in 1952, and its sister ship, *Ark Royal*, was undergoing sea trials in 1954. These vessels incorporated a major innovation, the angled deck, which revolutionised carrier operations and which was copied by the US Navy. Hitherto there had been a danger that an aircraft that failed to engage arrester wires would collide with aircraft parked at the forward end of the deck; now recovery and launch operations could be carried out much more quickly and safely without affecting the deck park. Britain had not lost its ability to take a technical lead in naval warfare.

The main threat from the Soviet navy was to Britain's sea communications with North America and Europe, and to her trade routes. Although the Soviet navy had only four cruisers in 1945, another seven whose construction had been suspended during the war were completed soon afterwards. About twelve 'Sverdlov'-class cruisers, which were broadly the same size as, but much newer than, British cruisers, were launched between 1950 and 1954, with six more under construction. Prior to their appearance, the main threat from the Soviet navy was expected to be from submarines and mines. The Russians had been able to take over U-boats of the latest type in 1945, with long cruising ranges and high underwater speeds; the same types that had caused the Admiralty so much anxiety in the last months of the war. It could be assumed that the large numbers of Soviet post-war submarines would be similar in design and would be difficult to deal with. Consequently, as table 5.1 shows, the post-war Royal Navy gave a high priority to trade defence by retaining what by international standards were large numbers of cruisers and escorts.

³² 'Battleships *versus* aircraft', CP (45) 57, 2 July 1945, CAB 66/67, TNA.

Table 5.1. *Navies in 1954: numbers of ships (with numbers completed since war in brackets)*

	USA	Britain	USSR	France
Fleet aircraft carriers	27 ^a (11)	7 ^b (4)	0	0
Light fleet carriers	8 ^c (2)	8 ^d (3)	0	3
Escort carriers	66 (8)	0	0	1
Capital ships	16 ^e	5 ^f (1)	3	2
Cruisers	73 (18)	23 (1)	24 (18)	6
Destroyers	346 (55)	82 (45)	128 (73)	15 (5)
Escorts ^g	265	175 (19)	38	27
Submarines	183 (17)	57 (19)	370–400 ^h	14 (5)

Notes: ^a Including vessels undergoing modernisation.

^b Including two reduced to reserve in 1954 and one under reconstruction.

^c Including one laid up in reserve.

^d Including three in use for training and one used for transporting troops and aircraft.

^e Including two 'large cruisers' of 27,500 tons with nine 12-inch guns. Ten of the older battleships were in reserve.

^f Including four in reserve.

^g Excluding vessels under 1,000 tons.

^h Precise numbers unknown. About half were ocean-going types.

Source: *Jane's Fighting Ships 1954–55* (1955).

Table 5.1 also shows that, although much smaller than the US Navy, the British fleet was still the second largest in the world in terms of surface vessels and the third largest overall. The Royal Navy had more major ships built in the ten years down to 1945 than it could use. Apart from HMS *Superb*, which was almost complete when Japan surrendered, no new cruisers entered service until 1959. There was no urgent need for replacements and the new automatic 6-inch guns and fire-control system planned for the next generation of cruisers would not be ready until the mid-1950s. Likewise, it was more economical to convert existing destroyers for anti-submarine warfare by adding new long-range depth-charge mortars when these became available and to improve Sonar and radar systems than to embark on a large new construction programme. As it became clear that there would never be enough funds to meet the numerical requirements of another Battle of the Atlantic, the emphasis on new designs for escorts was on economy with just sufficient speed to deal with Soviet submarines. Quantity became more important than quality. When the Admiralty proposed in April 1950 to scrap thirty-eight old escort vessels, the newly appointed Parliamentary Secretary to the Board, James Callaghan, who had served in the navy, took the unusual step for a junior minister of arguing successfully the case for modernisation, citing the use made of the fifty old American

destroyers in the Second World War. A further threat was mine-warfare, of which the Soviet navy had considerable experience. By 1949–50 it was clear that the Royal Navy's equipment to deal with mines was out of date and new coastal minesweepers with advanced Sonar were designed to meet the threat.³³ The shape of the Royal Navy, and the design of its equipment, was as good a response to the Soviet threat as budgetary constraints and shortage of manpower permitted.

Army weapons

In 1950 the army still held about 5,000 tanks built during the Second World War, but about half were unserviceable. Only 300 were selected after the outbreak of the Korean War to be given more powerful guns to make them more suitable for use in modern warfare.³⁴ On the other hand, the army benefited from the renaissance in British tank design that had begun during the war. In 1943 the Department of Tank Design had been asked to start work on a new heavy cruiser tank, with good armour protection and a 17-pounder (76.2-mm) gun. Some 350 of these Centurion medium tanks (as they were classed in the post-war period) were produced in 1946–8, before an improved version, the Mark 3, with a 20-pounder (83.4-mm) replaced it. The Mark 3 was used successfully by the British army in Korea and was widely exported, 2,833 being produced between 1948 and 1955/6.³⁵ This success story is hard to fit into a story of British decline, and suggests that when design and production capacity was concentrated on a single model, instead of a multiplicity of models, as in the 1930s and during the war, Britain was competitive in tank design.

On the other hand, the army did suffer from financial restraint after 1945. Wartime artillery – the 5.5-inch medium gun, the 25-pounder field gun, and the 6-pounder and 17-pounder anti-tank guns – continued to serve in the post-war period. More modern weapons, the 3.5-inch rocket launcher and the 120-mm recoilless gun, were introduced into service in 1951/2. As in the Second World War, the infantry lacked firepower. Experience in Korea, particularly in the Battle of the Imjin River in April 1951, when a battalion of the Gloucestershire Regiment serving in the Commonwealth division was overrun, showed the shortcomings of the bolt-operated magazine rifle when dealing with attacks

³³ Grove, *Vanguard to Trident*, pp. 39–40, 58–64, 68–78.

³⁴ 'The Defence production programme', memorandum by the Minister of Defence, 6 Jan. 1951, PREM 8/1357, TNA.

³⁵ Christopher Foss (ed.), *Jane's Armour and Artillery 1984–85* (London: Jane's Publishing Company, n.d.), pp. 95–9.

by mass formations at night. From the mid-1950s the Lee-Enfield, which had been used in both world wars, began to be replaced by a semi-automatic rifle of Belgian design.³⁶

The economy: searching for stability, 1945–50

Financial restraint was inevitable after the war when, in Keynes' words, Britain faced a 'financial Dunkirk'. Lend-Lease had enabled Britain to concentrate on munitions production but ended with the surrender of Japan. In 1945 British exports were only 46 per cent of the 1938 volume, yet Britain would have to export more than before the war in order to avoid a balance-of-payments deficit on current account. Net income from abroad had been reduced between 1938 and 1945 from £168 million to £50 million, as a result of the sale between September 1939 and June 1945 of £1,118 million of overseas assets, and an increase in external liabilities of £2,879 million, mainly sterling balances. Under the Anglo-American Loan Agreement of December 1945, Britain became liable for a further \$650 million (£161 million) in respect of Lend-Lease supplies unconsumed or in transit at the date of Japan's surrender, and was granted a line of credit of \$3,750 million (£930.5 million) to help to cover an estimated balance-of-payments deficit of £1,250 million while she was converting her economy from war to peace. Britain was to repay the principal of the loan plus interest at 2 per cent over fifty years, starting in 1951. More important, Britain had to undertake to make sterling convertible for current transactions a year after ratification of the loan by Congress and to remove discrimination against imports from the United States. British Treasury officials believed that it would be necessary to control dollar imports during a longer transitional period than one year and the secret reflection of the Chancellor of the Exchequer, Hugh Dalton, was that it was quite certain that the conditions attached to the loan would have to be revised later. The Labour government acquiesced in the American demands because, as Keynes had advised, the alternative to borrowing would not only be greater austerity than during the war and a delay in implementing welfare measures, but also rapid and humiliating withdrawal from overseas commitments and acceptance for the time being of the position of a second-class power.³⁷

³⁶ Michael Hickey, *The Korean War: The West Confronts Communism* (London: John Murray, 1999), pp. 220–33, 361.

³⁷ *Collected Writings of John Maynard Keynes*, vol. XXIV, p. 410; Hugh Dalton, *Memoirs 1945–1960: High Tide and After* (London: Frederick Muller, 1962), p. 89; G. C. Peden, 'Economic aspects of British perceptions of power on the eve of the Cold War', in Josef

The fact that colonial produce could earn dollars for the sterling area led the Labour government to pursue colonial development more energetically than any pre-war government had done. African colonies were expected to progress to self-rule over a longer period than actually occurred, and continued association with Britain through the Commonwealth was assumed.³⁸ Communist insurgency in Malaya threatened production of dollar-earning rubber and tin, and was dealt with firmly following a declaration of an emergency on 18 June 1948. The natural resources of the Commonwealth and Empire were seen in the Treasury as a major advantage in regaining 'viability', that is independence of American economic aid.³⁹ A complicating factor was the pooling of Britain's dollars with those of the rest of the sterling area; whereas the colonies were net contributors to the pool, as a result of strict controls on their imports, the dominions were normally in heavy deficit with the dollar area. Moreover, while the sterling area maintained controls on expenditure or investment in foreign currencies, there were no controls within the area, allowing unplanned capital movements from Britain to the dominions to occur and placing pressure on sterling. Another problem was that over £3,000 million of Britain's external liabilities were in the form of sterling balances, and while much of this sum was tied up in the form of currency reserves, holders naturally wanted to use some sterling to pay for imports from Britain. However, Britain required her limited supply of exportable goods to earn dollars, so as to be able to finance her trade with the United States. The Treasury had to conduct difficult negotiations with Argentina, Egypt, India and Pakistan in 1946 and 1947 to secure the agreement of these countries to accept phased releases of sterling balances, and by 1949 political pressures made it impossible to keep releases as low as had been agreed.⁴⁰

The full weakness of Britain's external position was exposed when, under the Anglo-American Loan Agreement, current earnings of sterling – but not the war-time sterling balances – became convertible into dollars on 15 July 1947. There was a sharp increase in the rest of the

Becker and Franz Knipping (eds.), *Power in Europe? Great Britain, France, Italy and Germany in a Postwar World* (Berlin: Walter de Gruyter, 1986), pp. 237–61.

³⁸ D. K. Fieldhouse, 'The Labour governments and the Empire-Commonwealth, 1945–51', in Ritchie Ovendale (ed.), *The Foreign Policy of the British Labour Governments, 1945–1951* (Leicester University Press, 1984), pp. 83–120, at pp. 95–102.

³⁹ Sir Richard Clarke, *Anglo-American Economic Collaboration in War and Peace 1942–1949*, ed. Alec Cairncross (Oxford: Clarendon Press, 1982), pp. 191, 204.

⁴⁰ John Fforde, *The Bank of England and Public Policy 1941–1958* (Cambridge University Press, 1992), pp. 95–124, 249–67; Pressnell, *External Economic Policy*, vol. I, pp. 247, 347–52, 365–6.

sterling area's deficit with the dollar area, and capital movements from Britain to the rest of the sterling area financed this deficit. Britain was unable to maintain sterling convertibility after five weeks.⁴¹ There was a general shortage of dollars in Western Europe, owing to the costs of imports from the United States of food and of capital equipment for industrial reconstruction, and already by July 1947 the American administration was planning what became Marshall aid, which provided a fresh source of dollars from mid-1948 to the end of 1950.⁴² Devaluation of sterling in September 1949 encouraged British exporters to look to American markets, but it would only bring Britain's external account into balance if the volume of exports earning dollars increased, and with the economy at full employment, an increase in exports implied diversion of output from home markets and defence. The government's *Economic Survey for 1950* rightly anticipated that the balance of payments would remain the central economic problem for many years ahead.⁴³

In contrast to the 1930s, there was a general labour shortage, which was made worse by the increased size of the armed forces. Numbers had peaked at 4,653,000 in mid-1945 and even in November 1946 the figure was 1,510,000, compared with 385,000 in 1938.⁴⁴ Given Britain's foreign policy commitments, Bevin was a powerful opponent of a more rapid demobilisation, and he also gave his support to universal conscription in peace and to the Ministry of Defence's plans to retain industrial capacity and design staffs for munitions. Consequently, the Minister for Defence, Alexander, was able to resist Treasury demands for a greater reduction in the size of the armed forces and in their expenditure down to the convertibility crisis. Dalton, the chancellor, simply carried less weight in Cabinet than Bevin did. In the light of the suspension of convertibility, and the likely delay before further American aid would become available (Congress did not approve the appropriations for Marshall aid until June 1948), Dalton tried again, and in August 1947 Bevin agreed that reorganisation of the armed forces ought to allow more rapid demobilisation. The Chiefs of Staff were instructed to review policy on the assumption that it would not be possible to contemplate undertaking a major war until Britain's

⁴¹ Cairncross, *Years of Recovery*, pp. 79–80, 153–63.

⁴² See Alan Milward, *The Reconstruction of Western Europe 1945–51* (London: Methuen, 1984).

⁴³ *Economic Survey for 1950* (Cmd 7915), PP 1950, xix. 577–628, paras. 40 and 48–50.

⁴⁴ Central Statistical Office, *Statistical Digest of the War*, pp. 8–9; *Statement on the Economic Considerations Affecting Relations between Employers and Workers* (Cmd 7018), PP 1946–47, xix. p. 1195.

economic strength had recovered, and that the risk of a major war must be ruled out over the next five years. On 29 September the Defence Committee agreed that the strength of the armed forces should be reduced from 1,227,000 in September 1947 to 713,000 by the end of March 1949, while accepting that 'serious risks and political consequences' were involved.⁴⁵

Balance-of-payments difficulties were only partly relieved by Marshall aid, since recipients were expected to become financially independent after the American fiscal year 1950/1. The Treasury was now represented in Cabinet by the formidable Cripps, who had replaced Dalton in November 1947. The Chancellor took a stand in November 1948 on £700 million as a maximum for expenditure on the armed forces, and the Inter-service Working Party on the Size and Shape of the Armed Forces was set up, with a representative of each of the services, and a neutral chairman, Edmund Harwood, a civil servant from the Ministry of Food, to see what could be financed with that figure. The report produced in February 1949 was guided by three requirements set out by the Chiefs of Staff: first, sufficient provision for waging the Cold War effectively; second, limited insurance against the threat of unpremeditated war; third, maximum insurance against the more likely threat of premeditated Soviet aggression in 1957 or later. It concluded that existing priority for research and development should be maintained, to ensure that equipment would be up to date in 1957, with special reference to defence against attacks by aircraft or missiles carrying atomic weapons. Consequently the Working Party's proposed economies focused on reducing the size of forces to be maintained over the period 1950–3.⁴⁶ The Chiefs of Staff believed that the report showed that £700 million was too low a figure to meet the requirements that they had set.⁴⁷ This view was endorsed by the Minister of Defence, Alexander, who told ministerial colleagues in June 1949 that the question was one of whether Britain still had the resources to maintain the forces equipped to modern standards required to allow her to play the role of a great power and maintain her overseas commitments.⁴⁸ The outcome in July 1949, after discussion over four meetings of the Defence Committee at which Cripps was unable to hold the line at £700

⁴⁵ Dalton to Attlee, 11 Aug., and Bevin to Attlee, 15 Aug. 1947, PREM 8/833; Cabinet Defence Committee minutes, 29 Sep. 1947, CAB 131/5, TNA.

⁴⁶ 'Size and shape of the armed forces: report of the Harwood Working Party', DO (49) 47, 21 June 1949, CAB 131/7, TNA.

⁴⁷ 'Size and shape of the armed forces 1950–53', report by the Chiefs of Staff, COS (49) 50, 22 June 1949, CAB 131/7, TNA.

⁴⁸ 'Size and shape of the armed forces 1950–53', memorandum by the Minister of Defence, DO (49) 51, 27 June 1949, CAB 131/7, TNA.

million, was yet another working party, this time chaired by Sir Harold Parker, permanent secretary of the Ministry of Defence, with instructions that the total defence burden was not to exceed £810 million.⁴⁹ Even in a period of severe economic difficulties, and with devaluation only a few weeks away, the Treasury was unable to dictate what the limits on defence expenditure should be.

Although post-war industrial policy gave priority to the civil economy, considerable efforts were made to retain capacity for designing and producing weapons. The Ministry of Aircraft Production was merged with the Ministry of Supply and the combined department was given responsibility for the needs of the RAF and army as well as oversight of engineering and atomic energy. Research and development contracts, orders for jet aircraft, and repair work kept nineteen airframe and aero-engine design teams in business, more than the volume of work justified. In July 1950 the Defence Committee approved rationalisation plans that would have reduced the number to thirteen, but rearmament associated with the Korean War delayed restructuring of the industry. The Ministry of Supply hoped to keep four independent tank design teams in being, but army contacts were too limited to persuade motor vehicle firms to stay in the field and even Vickers experienced financial problems on account of surplus capacity. More royal ordnance factories were kept in being than were required for current service requirements. The problem facing all defence contractors until 1950 was the low level of government expenditure on research and development and procurement compared with what planners had assumed: only about half in 1948, for example. Overall defence expenditure was not much below what had been expected, but the cost of maintaining forces large enough for Britain's global responsibilities made it necessary to economise on research and development and procurement.⁵⁰

The economy and rearmament, 1950–4

Manpower in the armed forces and defence expenditure as a proportion of GDP were reduced until 1950 (see tables 5.2 and 5.3). The fears provoked by the outbreak of the Korean War reversed these trends. On 26 July 1950 the United States asked NATO governments what additional expenditure they intended to carry out on their own, and how

⁴⁹ Interdepartmental Committee on the Defence Estimates, DE/M (49) 1st meeting, 14 July 1949, DEFE 10/65, TNA.

⁵⁰ Till Geiger, *Britain and the Economic Problem of the Cold War: The Political Economy and the Economic Effect of the British Defence Effort, 1945–1955* (Aldershot: Ashgate, 2004), pp. 38–9, 124–8, 132–3.

Table 5.2. *Strength of armed forces and women's services, 1945-54*

	('000, at June each year)
1945	5,120
1946	2,055
1947	1,312
1948	847
1949	770
1950	690
1951	827
1952	872
1953	866
1954	839

Source: Central Statistical Office, *Annual Abstract of Statistics*.

Table 5.3. *Defence expenditure as a percentage of GDP, 1946/7-1953/4*

Financial year	
1946/7	18.6
1947/8	9.0
1948/9	7.2
1949/50	6.7
1950/1	6.6
1951/2	8.6
1952/3	10.0
1953/4	9.2

Source: Central Statistical Office, *Annual Abstract of Statistics*; Mitchell, *British Historical Statistics* p. 830.

much more would be physically possible with American help. In Britain's case, programmed defence expenditure in the three financial years 1951/2 to 1953/4 prior to the outbreak of the war in June had been £2,340 million, and by the end of July various approved additions had raised this figure to £2,590 million. The Economic Section of the Cabinet Office and the Central Statistical Office calculated that it would be physically possible to add a further £800 million over that period, making a total of £3,400 million, and the Chancellor, Cripps, thought that the United States should be asked to finance half the total increase of about £1,100 million on the pre-July programme. The new programme was prepared and approved in about a week at the beginning of August, without waiting for any formal agreement on aid. In the event, the Americans made clear in September that they had no intention of

supplying dollars to help Britain deal with the consequences of rearmament for her balance of payments. Aid was to be primarily in the form of equipment and materials, with limited financial aid allocated according to a formula for fair sharing of the burden of defence by all NATO countries, including the United States. Meanwhile, the defence departments, realising that the financial brakes were off, sought further additions to their individual programmes, and the total defence programme for 1951/2 to 1953/4 was revised to £3,600 million at the end of August, this figure representing what Attlee called the maximum that could be done without resorting to a war economy. When the Chinese intervened in Korea in November, the Americans asked for greater efforts, and on 25 January 1951 the Cabinet agreed a new programme for 1951/2 to 1953/4 of £4,700 million, although the scale of diversion of labour from civil production, including exports, would be considerable.⁵¹ Even the new Chancellor of the Exchequer, Gaitskell, felt that failure to support the Americans would have serious consequences for NATO, and two of his principal economic advisers, Sir Robert Hall, head of the Economic Section, and Edwin Plowden, head of the Central Economic Planning Staff, both believed that the Second World War could have been avoided if Britain had reacted more quickly to the Nazi menace.⁵²

Nevertheless, how could the government decide to increase a programme for £3,600 million, which was supposed to be the maximum physically possible with a peace-time economy, to £4,700 million? When announcing the latter programme in January 1951, Attlee admitted that it might not be possible to spend all the money within the three-year period; that would depend on prompt delivery of machine tools and materials from the United States. He also claimed that far-reaching measures were being taken to secure increased production, but, although there was a partial reversion to war-time controls to allocate raw materials, the government did not restore the key war-time power to direct labour.⁵³ Instead employment exchanges took informal steps to guide workers to key jobs, but with the economy at full employment, not many workers were applying to employment exchanges. The crucial element in the programme was the demand to be placed

⁵¹ Cairncross, *Years of Recovery*, pp. 214–21.

⁵² Philip Williams (ed.), *The Diary of Hugh Gaitskell 1945–1956* (London: Jonathan Cape, 1983), p. 226; Edwin Plowden, *An Industrialist in the Treasury: The Post-War Years* (London: André Deutsch, 1989), pp. 97–8.

⁵³ 483 HC Deb., 5s, cc. 582–7. For reimposition of controls, see J. C. R. Dow, *The Management of the British Economy 1945–60* (Cambridge University Press, 1964), pp. 57, 159–62, 168.

Table 5.4. *Planned and actual rearmament expenditure on products of metal and engineering industries, 1950/1–1953/4*^a

Financial year	(£m.)	
	Planned ^b	Actual ^c
1950/1	170	170
1951/2	360	275
1952/3	590	470
1953/4	700	510

Notes: ^a Civil defence excluded.

^b March 1951 prices.

^c Current prices.

Source: Cairncross, *Years of Recovery*, p. 223.

on metal and engineering industries, collectively known as the metal-using industries, which included the motor industry, electrical goods, machine tools and shipbuilding, and which accounted for over 40 per cent of British exports.⁵⁴ Under the £4,700 million programme for 1951/2 to 1953/4, production by the metal-using industries directly for defence would have to increase from about £170 million in 1950/1 to about £360 million in 1951/2. One-third of the latter figure would be on aircraft, one-sixth on shipbuilding and marine engineering, and one-sixth on vehicles. There would have to be a large increase in employment in existing aircraft factories, and substantial new industrial capacity would be required for making aero-engines and tanks.⁵⁵ As table 5.4 shows, it did not prove to be possible to carry out the programme in full.

The figures in table 5.4 are approximate: the planned figures for 1951/2 to 1953/4 were flexible as between years, although the figure of £360 million for 1951/2 did appear in the *Economic Survey for 1951*. The gap between planned and actual output was greater than appears in the table because prices were rising. Production was held up by shortages of skilled labour and materials, and by delays in designing new equipment and in the delivery of machine tools and components. In the case of the Canberra bomber, production in 1951–2 was only about half of the planned level, and development of tail warning equipment was delayed, so that aircraft produced before 1953 lacked that important item of equipment. There were other examples of electronic equipment being delivered later than the aircraft for which it had been designed, including the Doppler Drift navigation device for the Valiant and the

⁵⁴ Cairncross, *Years of Recovery*, p. 222.

⁵⁵ *Economic Survey for 1951* (Cmd 8195), PP 1950–51, xxvii. 73–118.

Canberra.⁵⁶ Delays in production of the Hunter and Swift were primarily due to development problems. In the view of one insider, the aircraft industry had more projects than it could cope with.⁵⁷ Certainly rearmament brought about a boom: Ministry of Defence and Ministry of Supply expenditure on aircraft, including research and development, rose from about £200 million in the late 1940s to £570 million in 1954 and employment in the aircraft industry increased by 55 per cent between 1950 and 1954.⁵⁸ Such rapid expansion is rarely problem-free. Machine tools were kept in short supply for the defence programme as a whole because of the need to retain export markets. As the Ministry of Supply warned, 'curtailment of exports would involve the breaking of contractual delivery dates, and could not fail to be damaging in the long term'. In particular, the Canadian market, which had been lost during the war, and where a special effort was being made to recover lost ground, might be lost forever.⁵⁹

When the Conservatives returned to power in October 1951 they were warned by the Treasury that the country faced a balance-of-payments crisis brought about by rearmament and by rising prices of raw materials, the latter being in response to increased defence expenditure and strategic stockpiling in the world as a whole, especially the United States. The Permanent Secretary, Sir Edward Bridges, warned the new Chancellor, R. A. Butler, that the position was worse than in 1949, the year of devaluation, in that on current trends the gold and dollar reserves were likely to fall below the minimum of £500 million required for the operation of the sterling area by the end of June 1952. This date was subsequently advanced to the end of April when it was discovered in February that economic and defence aid from the United States would be \$225 (£80.4) million lower than expected. To ease the pressure on the pound Butler raised Bank rate and used controls inherited from Labour to cut imports from outside the sterling area. The Cabinet agreed on 30 October 1951 that all government departments, including the defence departments, must reduce their expenditure.⁶⁰

A review of the rearmament programme was begun in December, with an emphasis on reducing demand on the metal-using industries in

⁵⁶ 'Progress of rearmament programme: meetings between the Minister of Defence and service ministers', DEFE 7/669, *passim*; 'Programme report for 1952: note by Air Ministry', PDP/P (53) 3, 7 Feb. 1953, DEFE 7/670, TNA.

⁵⁷ Sir Roy Fedden, *Britain's Air Survival: An Appraisal and Strategy for Success* (London: Cassell, 1957).

⁵⁸ Edgerton, *England and the Aeroplane*, p. 89.

⁵⁹ 'Machine tools for £4,700 million defence programme', memorandum by the Minister of Supply, CPC (51) 3, 5 Feb. 1951, CAB 134/115, TNA.

⁶⁰ Peden, *Treasury and British Public Policy*, p. 458.

order to increase exports. It became clear that there was no prospect of the programme being completed by the end of March 1954, and that defence expenditure would continue to rise until 1955/6. The defence budget for 1952/3 was based on the hypothesis that the rearmament period would have to be extended by one year. The Treasury tried to secure an agreement with the Minister of Defence, Earl Alexander, that expenditure in 1953/4 would not exceed £1,600 million, but, with a system of annual budgeting, there was no means of ensuring that the three service departments' expenditure could be kept in check in future years.⁶¹ In May 1952 the Treasury produced a Cabinet paper pointing out that Britain was spending a higher proportion of national output on defence than in the late 1930s, and could not continue to rely on American aid. The paper pointed out the extent to which Britain's external financial position had deteriorated since before the war, and drew attention to preliminary studies that showed that defence was placing too great a burden on the metal-using industries. Butler was supported by Cherwell, who said that he agreed with almost everything in the Treasury's paper. The Board of Trade reported that overstraining the engineering industry was leading to increased prices and longer delivery dates at a time when competitiveness on international markets was paramount.⁶² On 29 May the Cabinet asked the Minister of Defence to examine the programme, in consultation with the Chancellor of the Exchequer, and in the light of the new strategic appreciation being prepared for him by the Chiefs of Staff, and to report on how economies could be secured and the pressure on the balance of payments eased.⁶³

This was the context for the Chiefs of Staff's Global Strategy paper in June 1952, the strategic aspects of which are dealt with in the next section of this chapter. Costing of the Global Strategy paper indicated that total expenditure for 1951/2 to 1953/4 would be £4,353 million, compared with Labour's £4,700 million programme for these three financial years, but another £3,724 million would be required over the two years 1954/5 to 1955/6.⁶⁴ Cherwell advised Churchill that the Chiefs' proposals were 'quite beyond the bounds of practical politics', in that the rise in the annual cost of defence would be the equivalent of 2s

⁶¹ G. R. M. Hartcup, 'History of the defence budget, 1946-71', Treasury Historical Memorandum (1971), pp. 4-5, T 267/23, TNA.

⁶² 'Economic policy', memorandum by the Chancellor of the Exchequer, C (52) 166, 15 May, minute by the Paymaster General to the Prime Minister, C (52) 171, 23 May, and 'The export problem', memorandum by the President of the Board of Trade, C (52) 175, 26 May 1952, CAB 129/52, TNA.

⁶³ Cabinet conclusions, 29 May 1952, CAB 128/25, TNA.

⁶⁴ 'The defence programme', memorandum by the Minister of Defence, C (52) 253, 22 July 1952, CAB 129/54, TNA.

(10p) on the income tax, at a time when the standard rate was 9s 6d (47.5p), barely below its wartime level of 10s (50p). Moreover, the services' proposed programmes for the products of the metal-using industries would increase from £500 million in 1953 to £570 million in 1954, making it harder to correct the adverse balance of payments on current account by increasing exports.⁶⁵

The Treasury's target for the load on the metal-using industries was £450 million, and a committee was set up in the Ministry of Defence under Sir Richard Powell, the deputy secretary, to find out what could be done if the Global Strategy figures were reduced by 8 per cent and by 10 per cent respectively. The Powell Report showed that the Chiefs of Staff's strategic aims were incompatible with Britain's economic position, and that commitments would have to be reduced. The Chancellor was advised by his officials to keep defence expenditure in 1953/4 below £1,550 million. By deferring fighter, naval and vehicle programmes, the Minister of Defence was able to offer a 'compromise' plan, the cost of which would be £1,645 million in 1953/4 and £1,698 million in 1955/6. In November 1952 the Cabinet agreed that the defence budget for 1953/4 should be £1,610 million at current prices, but that this figure would have to be increased to take account of an expected wage increase in the engineering industry and the additional expense of maintaining troops in Germany, now that the Germans were no longer required to pay for occupation costs. The load of defence orders on the metal-using industries was not to exceed £480 million in any one year, 18 per cent less than what would be required for the Chiefs of Staff's global strategy. Finally, the Cabinet instructed a committee chaired by Sir Norman Brook, the Cabinet secretary, to conduct a radical review of the defence effort after 1953 and to report on ways in which the defence budget could be cut further.⁶⁶ Inevitably, as the next section of this chapter will show, the Radical Review provoked inter-service competition for funds and made consensus on strategy difficult.

Given the overloading of industry, there was a need to establish priorities in the existing rearmament programme to speed up deliveries

⁶⁵ Cherwell to Prime Minister, 18 July 1952, PREM 11/49, TNA. Figures for the burden on the metal-using industries varied. The defence departments claimed that orders were never fulfilled on time, and used the figures in the text, which were 15 per cent below the total of orders that would be placed. Cherwell, on the other hand, argued that orders would tie up capacity even if industry failed to fulfil them, and used higher figures.

⁶⁶ Cabinet conclusions, 23 July 1952 and 7 Nov. 1952, both CAB 128/25; 'The defence programme', report by Chiefs of Staff, 29 Sep. 1952, with 'Report of the Committee on the Defence Programme' (Powell Report), 24 Sep. as annex, D (52) 41, CAB 131/12, TNA.

of the most urgent items. Consequently, a 'super-priority' scheme was set up. Churchill stated in December 1951 that overriding priority, even over exports, should be given to production of the latest types of aircraft, ammunition for them, and the new radar chain, with its control and reporting system, for the air defence of the United Kingdom. In January 1952 he specified Canberra and Valiant bombers, and Hunter, Swift and Javelin fighters, as the aircraft to be given priority, although of these types only the Canberra was in production. He also specified 20-mm ammunition, apparently in error, as the new fighters would use 30-mm ammunition. He then added Centurion tanks to the list.⁶⁷ The Treasury was suspicious of the effects of the super-priority scheme on exports – with some reason as the Ministry of Supply, which was responsible for operating it, sent out a standard letter to trade associations and main contractors in March 1952, asking them to give identified contracts priority 'over all other work of any kind whatsoever', including exports if necessary.⁶⁸ Duncan Sandys, the minister of supply, believed that the acceleration of selected items was his principal task.⁶⁹

In practice, the possibly beneficial effects of the scheme were diluted by a tendency on the part of the services and others to add items to the list. Nor was the list confined to defence equipment. Civil airliners – the Bristol Britannia, the de Havilland Comet and the Vickers Viscount – were also given super-priority in December 1952. The Society of British Aircraft Contractors and the Ministry of Supply hoped to break the American monopoly in world markets by delivering as many of these jet or turbo-jet aircraft as possible to foreign airlines before American jet airliners appeared later in the decade.⁷⁰ The Cabinet also agreed in December 1952 to add the Vulcan and Victor medium bombers, which were still at an early stage of development. Then in March 1953 the Minister of Defence wrote to Churchill suggesting that a new naval fighter, the N.113, should be given super-priority to deflect criticism of naval aviation, although the prototype was not due to fly until January 1954 and production was not expected until 1956/7. The head of the Treasury's division dealing with defence expenditure, G. P. Humphreys-Davies,

⁶⁷ E. A. Shillito (Treasury), 'Overriding priority for air programme', 20 Dec. 1951; Prime Minister to Minister of Supply, Minister of Labour and Chancellor of the Duchy of Lancaster, 20 Jan. 1952, T 225/511, TNA.

⁶⁸ Letter to trade association, 26 Mar. 1952, Ministry of Supply records, series 49, file 189 (AVIA 49/189), TNA.

⁶⁹ 'Notes of a meeting to discuss super priority for certain defence contracts', 1 Apr. 1952, AVIA 49/190, TNA.

⁷⁰ Additional notes for 'Super-priority for civil aircraft', memorandum by the Minister of Supply, C (52) 331, 15 Dec. 1952, AVIA 49/190; Cabinet conclusions, 16 Dec. 1952, CAB 128/25, TNA.

observed that there was no evidence that super-priority was involving any extra cost to the Exchequer in the field of aircraft production (as distinct from research and development) or doing any real harm to exports; the addition of the N.113 to the list would strengthen the case for cutting out other items and seemed 'unlikely in itself to do any real harm (or any real good)'.⁷¹

As regards the production of Centurion tanks, the Ministry of Defence had made out a case at the end of 1950 for two new factories to meet War Office requirements. Although the factories would make heavy demands on building labour and on machine tools, and would require two to three years to be brought into full production, the Treasury agreed to the proposal, being persuaded that there was no other way to supply the British and Commonwealth armies. The United States had no medium tank ready for production when the Korean War broke out and could offer only light tanks, in which the British army was not interested, until American production of new medium tanks had met their own and French requirements over the next three to four years; and no production on the European continent was in sight.⁷² In extending super-priority to Centurion tanks Churchill had in mind more than British requirements. He was advised by Sandys in January 1952 that, if tanks were given overriding priority, 800 Centurions could be produced in 1952/3, of which 200 could be sold to the American or other buyers. Sandys had misunderstood the position; the Ministry of Defence thought it most unlikely that more than 600 Centurions could be produced in 1952/3, of which 110 were for a Canadian order. One thousand Centurions could be produced in 1953/4, if given sufficient priority, and the Chancellor of the Exchequer, Butler, urged that as many as could be spared should be sold to the Americans. Churchill, however, was not prepared to deny even second-line Territorial formations Centurions in order to release more than 500 tanks for the Americans. In the event this figure broadly met the American requirement for 135 in 1952, and 200 in each of the following two years. Even with export orders, placed or in prospect, from Commonwealth countries and Sweden and Switzerland, Sandys agreed with the Chancellor that only 650 tanks should be produced in each of the years 1953/4 and 1954/5.⁷³

⁷¹ Alexander to Prime Minister, 11 Mar., and G.P. Humphreys-Davies, 'Super priority for the N.113', 12 Mar. 1953, T 225/511, TNA.

⁷² 'Increase of capacity for production of tanks', DO (50) 106, 28 Dec. 1950, G.P. Humphreys-Davies to E.G. Compton, 13 Jan., and Compton to William Armstrong, 18 Jan., 1951, T 229/850, TNA.

⁷³ E.A. Shillito, 'Tanks', 30 Jan.; Butler to Prime Minister, 15 Feb. (draft dated 14 Feb.); Churchill to Chancellor, Secretary of State for War and Minister of Supply, 16 Feb.; Shillito, 'Centurion tanks', 18 Feb.; anon., 'Tank production', n.d. but July; F.F.

Table 5.5. *UK share of export of manufactures from eleven industrial countries, 1937, 1948, 1950–8^a*

	(%)
1937	21.3
1948	29.3
1950	25.4
1951	21.9
1952	21.5
1953	20.9
1954	20.5
1955	19.8
1956	19.2
1957	17.9
1958	18.2

Note: ^a USA, Canada, UK, West Germany, France, Italy, Belgium, Netherlands, Sweden, Switzerland and Japan.

Source: London and Cambridge Economic Service, *The British Economy: Key Statistics 1900–1970* (1971), p. 17.

The overall effect of rearmament on exports is difficult to disentangle from other factors. Britain's share of exports of manufactures was already declining in 1950, as it was well above the pre-war level and was bound to fall as the German and Japanese economies recovered from war-time disruption (see table 5.5). The fall of 3.5 percentage points in a single year between 1950 and 1951 was not far short of the 3.9 percentage points in the two preceding years, 1948–50, suggesting that rearmament did make a difference, but from 1951 to 1953 change was gradual, suggesting that Treasury and Board of Trade attempts to prevent defence crowding out exports had some success. Exports of engineering products actually increased by 4 per cent between 1950 and 1951, but this was less than the 16 per cent increase between 1949 and 1950. Exports of the metal-using industries as a whole fell only slightly as a proportion of total exports between 1950 and 1951, from 49.4 to 46.6 per cent.⁷⁴ Nevertheless, rearmament did check the expansion of exports required for a sound balance of payments on current account, and by slowing delivery dates may have made British goods more uncompetitive than they might otherwise have been.

Turnbull, 'Tank production', 8 Aug., and Duncan Sandys to Alexander, 17 Nov. (all 1952), T 229/850, TNA.

⁷⁴ *Economic Survey for 1952* (Cmd 8509), PP 1951–52. xxv. 203–49, paras. 28, 30, and table 6.

Table 5.6. *Defence expenditure of leading NATO countries as a percentage of GNP at factor cost, 1949–55*

	Calendar year						
	1949	1950	1951	1952	1953	1954	1955
Canada	2.4	2.9	6.2	8.5	8.5	7.7	7.2
France	6.2	6.3	8.2	10.0	10.6	8.5	7.4
Germany (West)	n/a	n/a	n/a	n/a	4.9	4.7	4.8
Italy	3.9	4.2	4.7	5.0	4.2	4.5	4.1
UK	7.0	7.3	8.9	11.2	11.2	9.9	9.2
USA	5.1	5.5	10.8	14.9	14.7	12.7	11.0
Total, Europe	5.6	5.8	7.1	8.6	8.0	7.1	6.5
Total, NATO	5.1	5.4	9.7	13.0	12.4	10.7	9.4

Source: NATO Information Service, *NATO Facts and Figures* (Brussels, 1976), p. 294.

Till Geiger has noted that increased demand for machine tools for defence contractors disrupted investment in civil industry, but concluded that there was no conclusive proof that higher investment would have led to higher economic growth.⁷⁵ However, high defence expenditure did contribute to excess demand in the economy and to balance-of-payments problems. Both the Labour and Conservative governments tried to avoid an inflationary wage–price spiral by persuading the Trades Union Congress to encourage wage restraint, and to reduce pressure on sterling by curbing imports. Stephen Broadberry and Nicholas Crafts have argued that such policies, while effective at a macroeconomic level, created a non-competitive environment in which restrictive practices on the shop floor, and price fixing by business, flourished, to the detriment of productivity growth.⁷⁶ Lower defence expenditure would also have allowed some tax relief at a time when businessmen and the Labour government's economic advisers were critical of the effects of direct taxation on incentives to work harder or to take risks in new enterprises.⁷⁷

Britain devoted a higher proportion of her GNP to defence than her NATO allies in Europe (see table 5.6). The total NATO average was heavily weighted by the United States' contribution, and all countries except the United States were below the total NATO average after 1951. The United States, being then largely independent of foreign sources of

⁷⁵ Geiger, *Britain and the Economic Problem of the Cold War*, pp. 226–36, 292, 324.

⁷⁶ S.N. Broadberry and N.F.R. Crafts, 'British economic policy and industrial performance in the early postwar period', *Business History*, 38 (1996), no. 4, pp. 65–91.

⁷⁷ Daunton, *Just Taxes*, pp. 222–8.

food and raw materials, and possessing the bulk of the world's reserves of monetary gold, as well as the currency that other countries were anxious to obtain for their monetary reserves, could afford to run a balance-of-payments deficit on a scale that would have been inconceivable for Britain. Britain could not have devoted as high a proportion of her GNP to defence as the United States did from 1951 without bringing about a sterling crisis. Table 5.6 also shows that, despite her post-war economic problems, and despite reductions in the defence budget after 1947, Britain had been spending more on defence relatively than even the United States on the eve of rearmament in 1949 and 1950.⁷⁸

Global strategy

Given that British defence expenditure was pressing against the limits of what was economically possible, reliance upon a nuclear deterrent might seem to be a logical way of achieving security at affordable cost. However, the road to the 1952 Global Strategy paper was by no means straightforward, nor was it clear even then what the implications of the atomic bomb for defence policy would be. Planners servicing the Chiefs of Staff Committee had been formulating long-term strategy since before the end of the war, identifying threats, the nature of a future war, and what measures should be taken. Since it was assumed that war with the United States was unthinkable, and that Germany and Japan would be held down effectively, the only conceivable enemy was the Soviet Union. The planners assumed that premeditated war by the Soviet Union was unlikely before 1956, given the time required for economic reconstruction and for manufacturing an adequate stock of atomic bombs.⁷⁹ The precise timing of when even the Americans would have produced enough atomic bombs for an effective deterrent was uncertain. The Soviet commander, Marshal Zhukov, said in 1955 that the United States had had only five or six atomic bombs in the immediate post-war period, and these had not had decisive significance.⁸⁰ The scientific advice given to the Deputy Chiefs of Staff's Atomic Weapons Sub-Committee in January 1946 was that for a long time the number of

⁷⁸ The figures in tables 5.3 and 5.6 are not comparable, being calculated on different bases (GDP/GNP) and for different periods (financial/calendar years).

⁷⁹ Julian Lewis, *Changing Direction: British Military Planning for Post-war Strategic Defence* (London: Sherwood Press, 1988), esp. pp. 244, 289, 305, 313–15. See, for example, 'Report by Joint Intelligence Sub-Committee on Russia's strategic interests and intentions', 1 Mar. 1946, *DBPO*, series I, vol. VI (1991), pp. 297–301.

⁸⁰ Holloway, *Stalin and the Bomb*, p. 153.

atomic bombs available would be so limited that only important targets, like cities, would justify a nuclear attack.⁸¹

In February 1946 the Defence Committee agreed with Attlee that defence policy should be worked out on the assumption that Britain would not have to fight a major war during the next two or three years; that in a future major war the United States would probably be on Britain's side; and that no hostile fleet capable of being a menace to Britain's security would exist during the next few years.⁸² On 2 March, in response to a Chiefs of Staff paper expressing views on the importance of excluding the Soviet Union from the trusteeship of any Italian colony and of keeping the Mediterranean route open, Attlee circulated radical proposals for reducing Britain's commitments. He argued that the British Empire had been built up in the era of sea power, which had now become vulnerable to air power in land-locked seas like the Mediterranean, even if one did not take account of the changes resulting from atomic weapons. Britain would be unable to keep open the Mediterranean route in war and, once India was independent, there would be less reason to think in terms of imperial communications to the East. It might be better to think instead of the British Isles as an easterly extension of a strategic area centred on the American continent. From this perspective, Britain could withdraw her troops from Greece, Egypt and the rest of the Middle East without weakening herself.⁸³ Bevin, however, argued that Britain's presence in the Mediterranean area had more than a purely military purpose. If British forces withdrew, Italy, Yugoslavia, Greece and Turkey would fall under Soviet influence, like Eastern Europe, and Britain would also lose its position in the Middle East, where Iraqi oil was now 'one of our greatest assets'. On the other hand, in view of political difficulties in Egypt and Palestine, he favoured relocating the main British base from Egypt to Mombasa in Kenya, where it could also provide an alternative to India for the defence of the Indian Ocean. The Chiefs of Staff responded in April that East Africa might provide a useful reserve base, but was too remote to serve as the Mediterranean fleet's headquarters and lacked the infrastructure required by the army and air force.⁸⁴

The Chiefs of Staff's case for a continuing presence in the Middle East was based on more than imperial communications and oil. They

⁸¹ DCOS (AWC) (46) 1, 30 Jan. 1946, CAB 82/26, TNA.

⁸² Cabinet Defence Committee minutes, 15 Feb. 1946, CAB 131/1, TNA.

⁸³ 'Future of the Italian colonies', memorandum by the Prime Minister and Minister of Defence, DO (46) 27, 2 Mar. 1946, CAB 131/1, TNA.

⁸⁴ 'Memorandum by the Secretary of State for Foreign Affairs', DO (46) 40, 13 Mar. 1946, and 'Location of Middle East forces', report by the Chiefs of Staff, DO (46) 28, CAB 131/2, TNA.

also argued for the retention of air bases from which industrial areas in the Urals and Western Siberia could be threatened to deter Soviet aggression in Western Europe. Attlee was not immediately persuaded, but in January 1947 the Chiefs of Staff, led by Montgomery, threatened to resign as a body on what they considered to be a crucial issue. Already, in the summer of 1946, the services' Joint Technical Warfare Committee was examining the use of atomic and bacteriological weapons against the Soviet Union, and the question of aircraft range had drawn attention to the importance of bases not only in the Middle East but also, if possible, North-West India. In the event, political obstacles to air bases in India and Pakistan after these dominions became independent on 15 August 1947 were too great, making bases in the Middle East seem even more important.⁸⁵

In any case it was not easy to liquidate commitments in the Mediterranean and Middle East. Even after Truman had announced in March 1947 that the United States would take over responsibility for helping Greece to resist Communism, British troops, to the strength of one brigade, remained in the country until 1950, after the civil war was over, and Britain also provided aid in the form of training and equipment.⁸⁶ The Palestine mandate became a liability as the communal struggle between Arab and Jew intensified, and in September 1947 the British Cabinet decided to transfer the problem to the United Nations and to withdraw both troops and civil administration by mid-1948. Continuing British influence in Jordan was secured by a treaty guaranteeing British bases there in return for subsidies for the Jordanian army, the Arab Legion, which remained under British command until 1956. The major British presence was in Egypt, where military and air bases and training grounds in the Suez Canal Zone covered a vast area. It did not prove possible to reach an agreement with the Egyptian government on how to replace the Anglo-Egyptian Defence Treaty of 1936 on terms that would allow the British to remain and yet be acceptable to Egyptian public opinion. There were serious riots in 1952 and, confronted with the difficulty of maintaining a base in hostile territory, the British settled for an agreement in October 1954 whereby all British forces would withdraw within twenty months but the Suez base would be maintained by civilian workers to the standard required for it to be used in war, with Britain having the right to re-entry in war-time

⁸⁵ Richard Aldrich and Michael Coleman, 'Britain and the strategic air offensive against the Soviet Union: the question of South Asian air bases, 1945-1949', *History*, 74 (1989), 400-26.

⁸⁶ Kenneth Morgan, *Labour in Power 1945-51* (Oxford: Clarendon Press, 1984), pp. 252, 254.

for the next seven years. British hopes that the United States or Commonwealth countries would co-operate in the defence of the Middle East had largely evaporated by 1954. As the Americans became aware of Britain's difficulties with Egypt they preferred to pursue an independent policy. The Australians and New Zealanders were more concerned with the Communist threat in South-East Asia, and South African promises of an armoured division and aircraft to reinforce Commonwealth forces in Egypt did not materialise.⁸⁷

The importance of atomic bombs in British grand strategy was made apparent in a major review of future defence policy by the Chiefs of Staff in May 1947. It was assumed that, even with the help of allies, it would not be possible to stop the Red Army from overrunning North-West Europe, from where the United Kingdom could be subjected to attack by missiles, as in 1944–5, but on a scale that might cause irreparable damage even without the use of atomic weapons. However, by the expected critical period in East–West relations, about 1956, it would be possible to achieve rapid and decisive results by using weapons of mass destruction against key economic targets and civil populations. The power of atomic and biological weapons was so great that ‘within the next ten years’ there was little possibility of defensive forces reaching the standard necessary to prevent the delivery of enough weapons of mass destruction to knock out the United Kingdom. The only way in which to impede an enemy build-up in Western Europe would be by air attacks, and it was doubtful if conventional weapons could achieve decisive results. While the United Kingdom's greater vulnerability to atomic bombs and biological warfare, compared with the Soviet Union, might be seen as an argument for an international convention to abolish weapons of mass destruction, the Chiefs of Staff argued that there could be no guarantee that the Soviet Union would not be tempted to use them. In their view, the only way to prevent their use would be to let the Soviet Union know that it would suffer from large-scale damage too. While the United Kingdom was the best base for mounting an air offensive, because of the infrastructure of air bases and other resources, the Middle East would also be important, particularly for attacks on Soviet oil production in the Caucasus. Notwithstanding the emphasis on weapons of mass destruction, the paper also stated that by 1956 the threat to sea communications would also be greater than in the Second World War.⁸⁸

⁸⁷ W. Roger Louis, *The British Empire in the Middle East, 1945–1951* (Oxford: Clarendon Press, 1984), pp. 9–10, 720–3, 731–4; David R. Devereux, *The Formulation of British Defence Policy towards the Middle East, 1948–56* (Basingstoke: Macmillan, 1990), pp. 41, 68–99, 121–41.

⁸⁸ ‘The overall strategic plan’, May 1947, DO (47) 44, reproduced in John Baylis, *Diplomacy of Pragmatism*, pp. 134–49.

As the Cold War became more threatening, plans had to be made for a nearer future than 1956. The Chiefs of Staff were divided in February 1948 as to the best contribution Britain could make to the emerging Western European Union (WEU). The CAS, Tedder, and the First Sea Lord, Admiral Sir John Cunningham, believed that support for France and the Benelux countries should be limited to air and naval forces. The CIGS, Montgomery, argued that some contribution of land forces would be necessary for political reasons, and proposed two divisions out of a projected WEU total of forty-eight, but Attlee sided with Tedder and Cunningham.⁸⁹ In December 1948 the Chiefs of Staff advised ministers that, if war broke out before July 1950, the only offensive action that the Western Allies could take against the Soviet Union would be from the air. The USAF had 400 strategic bombers, but would not have enough aircraft to spare for a major direct contribution to the defence of Western Europe, the United Kingdom or the Middle East. Given the short range of Bomber Command's 160 aircraft, the British contribution would be restricted to trying to prevent the Soviet build-up in Western Europe and to assist in slowing the Soviet advance into the Middle East. It was assumed that the Soviet Union would have no atomic bombs, but that weaknesses in the United Kingdom's air defences would make the situation critical unless the American strategic air offensive reduced the weight of the Soviet attack. The Chiefs of Staff could not assess the likely effect of the air offensive because the Americans had not divulged how many atomic bombs would be available. The Soviets were also expected to disrupt essential sea communications by using submarines, mines and aircraft. The American-British-Canadian plan aimed to defend the United Kingdom and essential sea communications, but it was anticipated that Allied forces would be too small to hold Western Europe or the Middle Eastern oilfields, and that all that could be attempted would be to fight the enemy as far to the east in Europe, and as far to the north and east of Egypt, as possible.⁹⁰

By October 1949 the Air Staff was more ambitious, arguing that the Allies' only hope was to bring about a collapse of the Russian war-making machine by means of a strategic air offensive, and that Britain's contribution would ensure success. As Simon Ball has noted, the Air Staff's reasoning was connected to awareness of the vulnerability of Bomber Command in the defence programme.⁹¹ About the same time

⁸⁹ Michael Carver, *Tightrope Walking: British Defence Policy since 1945* (London: Hutchinson, 1992), pp. 11–12.

⁹⁰ 'Digest of plan "Speedway"', COS (48) 210, 16 Dec. 1948, DEFE 5/9, TNA.

⁹¹ S.J. Ball, *The Bomber in British Strategy: Doctrine, Strategy and Britain's World Role, 1945–1960* (Boulder, Colo.: Westview Press, 1995), p. 26.

the formation of NATO gave the War Office the chance to return to political as well as strategic arguments in favour of a greater continental commitment, to encourage the French, and in March 1950 the Defence Committee agreed to promise reinforcements of two divisions in the event of war, to add to the two based in Germany.⁹² There was a need to review defence policy and global strategy as a whole in the light of developments since the Chiefs of Staff's paper in 1947, and a fresh appreciation was completed in June 1950, just before the outbreak of the Korean War.

In 1950 the Chiefs of Staff still believed that it would be possible to develop more effective defences against air attack and warned that it would be dangerous for the Western powers to place all their hopes on 'an easy shortcut to victory via atomic weapons'. Research and development, they recommended, should be timed to ensure that NATO would be ready at the right moment to stand up to Soviet threats. Britain's own first defence priorities should be (a) the defence of the United Kingdom as a secure home base; (b) adequate strategic striking power; (c) a bare minimum of land, air and sea forces for Cold War purposes; and (d) minimum forces to hold the Egyptian base. The defence of the United Kingdom depended on an efficient air defence system, which must be given the highest priority, but also on the defence of sea communications with North America and Europe, and also on preventing Soviet forces from occupying the coast of Western Europe, as it would only be with the greatest difficulty that Britain could survive attacks from there. Priority (a), therefore, included naval and land as well as air forces. Priority (b), strategic striking power, was now to be concentrated in the United Kingdom and bombers would be sent to the Middle East only once Bomber Command had more resources. The Middle East was not written off, however, and the development of Egypt as an offensive base was described as a basic requirement of war-time strategy.⁹³

The continuing importance of conventional weapons in NATO planning was indicated by the decision at a meeting in Lisbon in February 1952 to adopt the target for the alliance of having fifty divisions ready by the end of the year, with a longer-term goal of ninety-six by the end of 1960. As already noted, however, the Treasury persuaded the Cabinet on 29 May 1952 to review Britain's defence programme from the point of view of reducing the burden on the economy and the

⁹² Defence Committee minutes, 23 Mar. 1950, CAB 131/8, TNA.

⁹³ 'Defence policy and global strategy', DO (50) 45, 7 June 1950, CAB 131/9, TNA, reproduced in *DBPO*, series 2, vol. IV (1991), pp. 411–31.

balance of payments (see p. 254). The outcome was the 1952 Global Strategy paper of 17 June. As the Chiefs of Staff explained, the conception of a war and deterrence had changed radically since 1950. It was now accepted that there would be no effective defence against atomic air attack in the foreseeable future. The primary deterrent to war must be the knowledge in the Kremlin that any Soviet aggression would lead to devastating retaliation by long-range bombers armed with atomic weapons. The Chiefs of Staff advised that public opinion should be 'educated to see beyond emotion' that 'the great atomic deterrent' to war was of 'vital importance to humanity'. They were, however, concerned that the Soviet Union might begin a war with a declaration that it would use atomic bombs only in retaliation, in the hope that public opinion in Europe would restrain the United States. In 1952 the Soviet Union lacked effective intercontinental bombers, and had no intercontinental rockets, which doubtless accounts for the Chiefs of Staff's confidence that the Americans, with whom 'the ultimate decision' would lie, would nevertheless use atomic bombs. Although the atomic deterrent would, for economic reasons, always be largely an American responsibility, the Chiefs of Staff believed that Britain should contribute her own atomic bomber force, because only then could she be sure that targets necessary for the defence of the United Kingdom – for example, enemy air and submarine bases – were attacked. Moreover, inability to contribute to the only allied offensive in a world war would weaken British influence with the United States on American planning and policy in the Cold War.⁹⁴

Logically such an analysis might have been expected to lead to the highest priority being given to strategic bombers armed with atomic bombs, but in June 1952 the first British atomic bomb had yet to be tested, and the medium bombers designed to carry atomic bombs would not begin to enter service for three to four years. The report did recommend that the current RAF expansion scheme target of a first-line strength of 882 bombers, of which 730 would be Canberra light bombers and 152 medium bombers, should be revised to something like 420, mainly medium bombers. However, conventional weapons were not downgraded. The report contained a curious section entitled 'The nature of a future war', which set out a theory of what came to be called 'broken-backed warfare'. It was suggested that after an opening phase of great intensity, lasting only a few weeks, in which both the Soviet Union and the United Kingdom would suffer terrible damage from atomic

⁹⁴ 'Defence policy and global strategy', D (52) 26, 17 June 1952, CAB 131/12, TNA.

bombs, there might be a long, intermittent war that would gradually spread round the world.⁹⁵ Slessor, the CAS, later said that the idea of a broken-backed phase of a war had been included because otherwise there would be no case for keeping a large navy; neither he nor the CIGS, Slim, believed in broken-backed warfare, but they accepted the need to justify a compromise whereby all three services would be treated equally in the cuts that the report was intended to identify.⁹⁶ It seems to have been in this spirit that the CAS agreed to the listing of the security of the United Kingdom and its sea communications ahead of the atomic air offensive in the report's conclusions. Nevertheless, Richard Moore has shown that for the navy, at least, the concept of broken-backed warfare was more than a contrivance to give an appearance of inter-service agreement. Plans were made for alternatives to the principal ports that would be subject to nuclear attack, a list of emergency minor ports being drawn up and minesweepers and escorts distributed round the coast to deal with the intense mining and submarine campaign with which the Soviet navy was expected to attempt to cut British sea communications.⁹⁷

Slessor believed that the basic strategy of air power must be offensive. Ball has shown how the CAS developed a counter-bombing strategy against military targets, like enemy bomber and submarine bases, in place of earlier plans directed against cities and economic targets, to protect Bomber Command from pressures in favour of diverting resources to other purposes, such as Fighter Command or Coastal Command, or the army or the navy.⁹⁸ Yet, inconsistently with the doctrine that there would be no effective defence against atomic air attack, the Global Strategy paper placed a high priority on Fighter Command, although not at the expense of Bomber Command. Fighter Command was due to undergo a major programme of re-equipment with swept-wing aircraft as soon as these were available, and the Global Strategy paper recommended a deferral of the expansion of the fighter force instead of equipping it with obsolescent types. No immediate reduction in Fighter Command was offered, although the prospect of air-to-air guided missiles increasing the efficacy of interceptors was held out as an 'ultimate' means of making savings at the expense of numbers of fighters (air-to-air guided missiles were not expected to become

⁹⁵ Ibid., para. 32.

⁹⁶ For Slessor's account, see Anthony Seldon, *Churchill's Indian Summer: The Conservative Government 1951–55* (London: Hodder and Stoughton, 1981), p. 335.

⁹⁷ Richard Moore, *The Royal Navy and Nuclear Weapons* (London: Frank Cass, 2001), pp. 66, 69.

⁹⁸ Ball, *Bomber in British Strategy*, pp. 50–60.

operational until 1956). An immediate economy was suggested of abandoning modernisation of medium anti-aircraft guns, since these weapons would 'in due course' (later than 1956) be replaced by surface-to-air guided missiles.⁹⁹

Although only four months had passed since the Lisbon goals had been adopted by NATO, the Chiefs of Staff were not optimistic about continental allies making the political and economic sacrifices necessary to reach the overall target of 96 divisions and 9,000 aircraft. The United Kingdom had agreed as a planning goal to assign to the Supreme Allied Commander Europe (SACEUR) by 1955 nine divisions and 1,550 aircraft, quite apart from Fighter Command (currently 650 aircraft), which would remain under national control. With war seeming less imminent than in 1950–1, the Chiefs of Staff recommended that the scale of the defence forces being created should be related to what could be maintained in the long term, bearing in mind the rapid turnover of equipment that would be necessary owing to the modern tendency for armaments to become obsolescent quickly. Research and development must keep ahead of the Russians. The recent development by the Americans of smaller atomic bombs for tactical air warfare would strengthen the defensive against the superior numbers of the Soviet army, and NATO should not attempt to maintain large ground forces in addition to a new atomic strategy. Accordingly, NATO should initiate a reassessment of the forces to be built up for war. In particular, the British target of 1,550 aircraft for SACEUR should be reduced to a total of 600 tactical aircraft, thereby accommodating the proposed expansion of the medium bomber force within a smaller budget. The army, however, was protected from being required to make a corresponding reduction in the number of its Regular divisions. The report pointed out that the Regular Army bore the brunt of the Cold War, both by commitments to NATO and through world-wide action to check Communist aggression and subversion. Its size should, therefore, remain at the equivalent of eleven divisions, and economies should largely be at the expense of the Territorial Army, which was designed to provide reinforcements in war-time.

In the summer of 1952 a revised version of the Global Strategy paper was taken by Slessor to the United States, where General Bradley, the chairman of the Joint Chiefs of Staff, criticised what he saw as its likely deleterious effects on attempts to build up NATO's conventional forces. Nevertheless, from January 1953 the new Eisenhower administration, faced with pressures from rising defence expenditure on the

⁹⁹ D (52) 26, paras 96, 101, 103–4, CAB 131/12, TNA.

Federal budget, responded on similar lines to the Global Strategy paper by developing a doctrine of 'massive retaliation', suggesting some causal connection. The common factor seems to have been the similarity of budgetary situations, however, and the American 'New Look' strategy of 1953/4 went further than the British Global Strategy paper of 1952 by rejecting the concept of broken-backed warfare.¹⁰⁰

Since the Global Strategy paper failed to produce sufficient economies to satisfy the Treasury, ministers looked for an alternative way of balancing armed and economic strength. The Radical Review of 1953 was unusual in that the Chiefs of Staff were excluded from ministerial discussions. Confronted with the cost of preparing for both the Global Strategy's short, atomic war, and its long, broken-backed war, ministers decided that the country could not afford both. At a meeting on 22 June, attended by Churchill, Cherwell, Butler, Alexander, the three service ministers and Sandys, it was agreed to accept the suggestion of the last-named, then minister of supply, that the Chiefs of Staff should be told to plan on the basis of a short war only. The only forces to be maintained were those that contributed in peace to Britain's position as a world power and which would be relevant to the first six weeks of war, during which time USAF strategic bombers would break the Soviet Union's will to fight.¹⁰¹ The effect of this 'June Directive', as it came to be called, was to remove the facade of agreement between the Chiefs of Staff in the Global Strategy paper. The First Sea Lord, Sir Rhoderick McGrigor, continued to insist on the necessity of preparing for a war of more than six weeks; the new CIGS, Sir John Harding, pointed to the role of the army in Cold War conflicts as well as a major war; and Slessor's successor as CAS, Sir William Dickson, had to defend the proposed size of the medium bomber force. There was a limit to the extent to which ministers could override the professional judgement of the Chiefs of Staff, and the concept of a period of 'broken-backed' warfare survived into the 1954 Defence White Paper.¹⁰² Indeed, the Admiralty received powerful backing in the Defence Committee in October 1953 from Churchill, who was unwilling to see old ships, perhaps especially the 'King George V'-class battleships, in reserve scrapped, as they would be

¹⁰⁰ John Baylis, *Ambiguity and Deterrence: British Nuclear Strategy 1945–1964* (Oxford: Clarendon Press, 1995), pp. 153–60; Ian Clark and N.J. Wheeler, *The British Origins of Nuclear Strategy, 1945–1955* (Oxford: Clarendon Press, 1989), pp. 174, 178–82.

¹⁰¹ Baylis, *Ambiguity and Deterrence*, p. 165.

¹⁰² *Statement on Defence 1954* (Cmd 9075), PP 1953–54, xxii. 471–96, para. 13.

useful in what he called 'the broken-backed warfare that is likely to succeed the first atomic phase of a future war'.¹⁰³

Sandys questioned the value of aircraft carriers in 1953, on the grounds that their functions could be carried out more economically by land-based aircraft. However, as at the time of the Inskip review in 1937, budgetary pressures created an alliance between the navy and air force against the army. In December 1953 Dickson accepted the Admiralty's argument that two fleet carriers were a small price to pay for having a say in American naval strategy. In return, McGrigor told the First Lord of the Admiralty that Britain needed an effective air force, but that the army could be greatly reduced, as soon as 'other arrangements could be made on the continent of Europe'.¹⁰⁴ The 'other arrangements' presumably included the prospect that the tactical atomic weapons mentioned in the 1952 Global Strategy paper would, when they became available three or four years hence, make possible reductions in conventional land forces. On the other hand, the Air Staff, holding out for 240 medium bombers, was vulnerable to the charge that it did not know how many it needed, given the refusal of the Americans to divulge which targets were already covered by the US Strategic Air Command.¹⁰⁵

By the end of the financial year 1953/4 Britain still lacked a coherent global strategy that struck a balance between atomic and conventional weapons. Another radical review would be required in 1954, and then in the light of a quantum jump in the power of nuclear weapons owing to the successful development by the Americans of the hydrogen bomb. Nevertheless, the prospect of Britain having its own atomic bomb, and the need to reduce demands on the metal-using industries and the budget, had created a flux in which new ideas about deterrence could be developed, with consequences for vested interests in the armed forces that could only be delayed by bureaucratic politics.

Summary

Notwithstanding her economic difficulties, Britain continued to maintain a considerable scientific-military-industrial complex after the war. The Attlee government committed Britain to a major nuclear research and development programme, which limited the supply of scientific and technical labour available for other projects, including guided missiles.

¹⁰³ Cabinet Defence Committee minutes, 10 Oct., CAB 131/13, cited in Grove, *Vanguard to Trident*, p. 95.

¹⁰⁴ First Sea Lord to J. Thomas, 23 Dec. 1953, ADM 205/93, cited in Baylis, *Ambiguity and Deterrence*, p. 168. See also Grove, *Vanguard to Trident*, pp. 93, 98–107.

¹⁰⁵ Ball, *Bomber in British Strategy*, pp. 91–2; Baylis, *Ambiguity and Deterrence*, pp. 171–2.

The British aircraft industry appeared to be backward compared with its American and Soviet counterparts, but this was mainly because the expectation that the maximum danger of war lay in the future, about 1957, led to a gap in British development and production of a number of important weapons systems. The timing of up-to-date strategic bombers was linked to the development of the British atomic bomb, which, although first tested in October 1952, would not be ready for operational use until about 1956. Meanwhile Britain was wholly dependent on the United States for nuclear deterrence.

The major economic problems were the overhang of debt from the war, which weakened sterling, and labour shortages, which made it difficult to compete in export markets. Conscription contributed to the labour shortage. Rearmament was in direct competition with exports for the products of the metal-using industries, and thereby adversely affected the balance of payments on current account. Britain was able to spend as much as she did on defence only as a result of American loans or grants to relieve the shortage of dollars. The Chiefs of Staff recognised that a weakening of Western economies through excessive defence expenditure would be to the advantage of the Communists, but this recognition did not reconcile them to the financial ceilings that the Treasury attempted to impose.

The formulation of global strategy was marred by inter-service rivalries, but there were real difficulties with uncertainty in international relations. Technological development was rapid and unpredictable. The 1952 Global Strategy paper was the first to be based on acceptance that enough atomic bombers would get through to make nuclear deterrence effective, but still made provision for greater conventional forces than the Treasury believed were compatible with a sound economy. In some respects the situation was similar to 1937, when the Treasury's doctrine of the fourth arm of defence helped to shape the Inskip Report. The Radical Review of 1953 pointed the way to greater economies than the Chiefs of Staff could agree on, and before a global strategy based on the atomic bomb could be settled, the nature of nuclear warfare was transformed by the development of American and Soviet hydrogen bombs.

6 The hydrogen bomb, the economy and decolonisation, 1954–1969

Introduction

The period covered by this chapter begins with the Churchill government's decision in the summer of 1954 to produce a British hydrogen bomb, and ends with dependence on the American Polaris system to deliver it. The Americans exploded their first thermonuclear device on 1 November 1952, less than a month after the first British atomic bomb test, and between 1 March and 13 May 1954 they carried out a series of tests showing that they had mastered the techniques of making hydrogen bombs. A hydrogen bomb falling on a city could kill a million people, compared with the 50,000 fatalities to be expected from an atomic bomb. The Russians detonated a thermonuclear device in August 1953 and their first true hydrogen bomb in November 1955.¹ The major consideration put forward by Churchill in Cabinet for developing a British hydrogen bomb was the effect it would have on Britain's influence in world affairs, and therefore on her ability to prevent precipitate action by the United States.² The belief that Britain should have such influence was shared by the Leader of the Opposition. When the government's decision was belatedly announced in the annual Defence White Paper in 1955, in terms that left no doubt that Britain would use the deterrent rather than submit to Communism, Attlee remarked that, in his experience, possession of nuclear weapons did have an effect on the rulers of other countries.³

The advent of the hydrogen bomb led to even more radical changes in defence policy than those set out in the 1952 Global Strategy paper, but enhanced nuclear deterrence was not the only factor. John Baylis has remarked on the extent to which British strategy was driven by

¹ For a full account of these developments, see Lorna Arnold, *Britain and the H-Bomb* (Basingstoke: Palgrave, 2001).

² Cabinet conclusions, 8 July 1954, CAB 128/27, TNA.

³ *Statement on Defence* (Cmd 9391), PP 1954–55, x. 475–504; 537 HC Deb., 5s, 1954–55, c. 2175.

economic considerations from the time that Anthony Eden became prime minister in April 1955.⁴ In June 1956, in a submission to a Cabinet committee reviewing future policy, the Treasury argued that successive governments had tried to do too much since the war, with the result that the balance of payments had been weak and sterling crises frequent. What had been achieved had been possible as a result of American loans and grants, but these were ending and would have to be repaid. The Treasury looked for major savings in public expenditure, including defence, in order to strengthen the balance of payments.⁵ The Treasury's arguments were powerfully reinforced by experience in the Suez crisis later in 1956, when the Americans were able to force the Eden government to stop the Anglo-French invasion of Egypt by the simple expedient of withholding support for sterling (see pp. 303–4). The Defence White Paper in April 1957 embodied both nuclear and economic arguments. On the one hand, scientific advances had fundamentally altered the basis of military planning; on the other, Britain's military power and influence in the world depended 'first and foremost' on the health of its economy. Consequently, conscription was to be phased out and the proportion of national income devoted to defence reduced in order to release labour and resources for the export trades.⁶

The 1957 White Paper made no attempt to reduce British overseas commitments, although the Commonwealth had been evolving with decolonisation. The implications for defence policy of independence for the African and remaining Asian colonies, which was to occur between 1957 and 1964, had been the subject of Cabinet discussions in 1954. A two-tier Commonwealth, with the upper tier restricted to countries capable of making a significant contribution to their own defence, was considered and rejected on the grounds that the other countries would secede rather than accept second-class membership. In practice it was already the case that India, Pakistan and Ceylon did not receive as much information from the United Kingdom on defence matters as Canada, Australia, New Zealand, South Africa and the Central African Federation, and it was anticipated that the existing practice of confining discussions to countries willing to accept military commitments for mutual defence would apply to new Commonwealth members.⁷ It was realised that the Commonwealth would not unite behind Britain in the Cold War in the same way as the Empire and Commonwealth had done in

⁴ Baylis, *Ambiguity and Deterrence*, p. 230.

⁵ 'The future of the United Kingdom in world affairs', PR (56) 3, 1 June 1956, and PR (56) 30, 20 July 1956, CAB 134/1315, TNA.

⁶ *Defence: Outline of Future Policy* (Cmnd 124), PP 1956–57, xxiii. 489.

⁷ Cabinet conclusions, 7 Dec. and 22 Dec. 1954, CAB 128/27, TNA.

two world wars, and that the way ahead lay through British membership of regional security pacts: NATO (of which Canada was also a member); the South-East Asia Treaty Organisation (SEATO), formed in 1954 with a membership including Australia, New Zealand and Pakistan, as well as France, the Philippines, Thailand and the United States; and the Baghdad Pact, formed in 1955, linking Turkey, Iraq, Iran and Pakistan, which became the Central Treaty Organisation (CENTO) after Iraq withdrew in 1959. The United States was not a member of CENTO but took part as an observer and contributed to the international staff and budget.

Decolonisation was designed to secure friendly relations with successor governments. In 1954 Britain had 45,000 troops in Malaya to combat the rising by Communist guerrillas that had begun in 1948. By the time Malaya became independent in 1957 the emergency was virtually over and Britain accepted responsibility for the country's external defence. In 1961 the possibility that the self-governing colony of Singapore might elect a left-wing government hostile to the maintenance of the British base there led to a scheme to bring Singapore into a pro-British Malaysian Federation, incorporating Malaya, Singapore and the British colonies of Sarawak, North Borneo and Brunei. Britain extended to the new federation the defence agreement originally made with Malaya, and when President Sukarno of Indonesia tried to assert territorial claims in Borneo in December 1962 British and Commonwealth troops were deployed in small-scale jungle fighting in what was called the 'confrontation' until peace was made in August 1966. Although British prestige was damaged by the Suez crisis in 1956, there was no precipitate retreat from the Middle East. Britain had treaties or other obligations for the protection of Kuwait, Bahrain, Qatar, the Trucial States, and Muscat and Oman, as well as the Aden Protectorate. A rebellion against the Sultan of Muscat and Oman was suppressed with British assistance in 1957. An Iraqi threat to Kuwaiti independence in 1961 led to the despatch of British troops and warships to secure Kuwait's continued membership of the sterling area and a supply of oil on favourable terms. The initially close relationship with former African colonies was brought out by the willingness of the Conservative government in 1964 to respond to the requests of the governments of Kenya and Uganda to send small forces to deal with civil unrest and military mutinies, an action approved by the incoming Labour Secretary of State for Defence, Denis Healey.⁸ As we shall see, it was only with reluctance that the Labour government of Harold Wilson decided during the

⁸ Denis Healey, *The Time of My Life* (London: Penguin, 1990), p. 279.

sterling crisis of 1967 to withdraw from commitments around the Indian Ocean.

The main issues discussed in this chapter are: was Britain's scientific-military-industrial complex able to keep up with international standards? What parts did the hydrogen bomb and the need to maintain a strong economy play in British strategy? Were changes in strategy signs of weakness and responses to relative economic decline, as Paul Kennedy believed?⁹ Or was David Greenwood correct to argue that British defence policy was not characterised by decline and contraction, but by reshaping to spend much the same amount of money in real terms in different ways?¹⁰ If so, did that reshaping reflect the increasing costs of weapons systems?

Polymakers

The Ministry of Defence, as it had been created in 1946, was not an effective mechanism for making choices that would change the balance between the three armed services. While Harold Macmillan was minister of defence from October 1954 to April 1955, he found he had no power, but was held to be responsible for everything that went wrong. Churchill continued to intervene a lot, chairing the Cabinet's Defence Committee. Macmillan had also to deal with the Foreign Office and with the ministers in charge of the Admiralty, the Air Ministry, the War Office and the Ministry of Supply; and he could give no instructions on his own. His experience at Defence, followed by a period at the Treasury, made him acutely conscious of the need for greater direction by ministers if there were to be radical changes in policy. When he became prime minister in January 1957 he decided that Anthony Head, who had been minister of defence in the Eden government, was too much of a 'service' man to make the cuts that the country's economic situation demanded.¹¹ Instead Macmillan chose Sandys, who had already shown independence of thought in defence matters while minister of supply in Churchill's government. Sandys was authorised to decide all matters of policy affecting the size, shape and organisation of the armed forces, and their equipment. His Defence White Paper in 1957 foreshadowed far-reaching changes, but to produce it he had to rely on a group of personal advisers and have a series of confrontations

⁹ Kennedy, *Rise and Fall*, pp. 477, 546–9.

¹⁰ David Greenwood, 'Defence and national priorities since 1945', in John Baylis (ed.), *British Defence Policy in a Changing World* (London: Croom Helm, 1977), pp. 174–207.

¹¹ *The Macmillan Diaries: The Cabinet years, 1950–1957*, ed. Peter Catterall (London: Macmillan, 2003), pp. 363, 369–70, 614.

with the Chiefs of Staff. Both Sandys and Macmillan believed that the changes in policy had been brought about in spite of the existing official arrangements. Sandys' efforts to combine the administration of the three defence services into a single integrated department ran into opposition from his senior advisers, apart from Earl Mountbatten, the first sea lord, and the White Paper on the central organisation of defence in 1958 was a disappointment to Macmillan. It stated that all proposals by any of the armed services had first to be submitted to the minister of defence; a Defence Board was set up at ministerial level to assist co-ordination; and the chairman of the Chiefs of Staff Committee became chief of the defence staff (CDS), with a small staff of his own. On the other hand, concessions were made to the autonomy of the three services: in particular, the advice given by CDS was to be that of the Chiefs of Staff Committee and, if it was divided, he had to report the different views as well as give his own.¹²

Mountbatten's appointment as CDS in July 1959 placed a centraliser in a key position, and he was able to persuade the Chiefs of Staff to agree to the new post of central director of plans, who would also chair the Joint Planning Committee. However, Macmillan preferred to wait until the time was ripe for major changes in the central organisation of defence. Sandys was moved in October 1959 to the Ministry of Aviation (the successor to the Ministry of Supply) and replaced by the more emollient Harold Watkinson. It was not until 1962–3, and then with a new minister of defence, Peter Thorneycroft, that Macmillan tried again. Mountbatten, whose period as CDS had been extended by Macmillan, put forward a proposal for the abolition of the separate defence departments and the creation of a single Ministry of Defence. Macmillan approved, but felt that he could not ride roughshod over the opposition of the Chiefs of Staff. Generals Ismay and Jacob, whose advice had shaped the Ministry of Defence in 1946, were asked to report on how it could be reorganised to reduce wasteful duplication, and came up with a compromise in February 1963 whereby the separate defence departments would retain many of their old functions in an otherwise unified ministry. The Chiefs of Staff retained the right of direct access to the prime minister as well as to the minister of defence.¹³ The creation in 1964 of a single ministry with one minister in charge of defence policy

¹² Sir Ewen Broadbent, *The Military and Government: From Macmillan to Heseltine* (Basingstoke: Macmillan, for Royal United Services Institute, 1988), pp. 19–21; *Central Organisation for Defence* (Cmnd 476), PP 1957–58, xxi. 501.

¹³ Broadbent, *Military and Government*, pp. 21–7, 216–17; Philip Ziegler, *Mountbatten: The Official Biography* (London: Collins, 1985), pp. 608–21; *Central Organisation for Defence* (Cmnd 2097), PP 1962–63, xxvii. 715.

did not bring inter-service rivalries to an end. Healey, who was secretary of state for defence throughout the period of Labour government from 1964 to 1970, may well have preferred divided counsels, since he was intellectually self-confident, had studied strategic problems prior to taking office, and had no reason to encourage united opposition within the ministry to his ideas.¹⁴

Churchill, Eden and Macmillan were all prone to taking a hands-on approach to defence, sending personal minutes to ensure that their views were being acted on. Much of the policymaking was conducted informally, with the Cabinet's Defence Committee and even more the Cabinet itself being involved at a late stage, often only to give authority to decisions that had already been taken and to ensure that information reached everyone concerned through the circulation of minutes. The way in which the decision to develop the hydrogen bomb was taken exemplifies this point. After hearing of the first American test on 1 March 1954 Churchill summoned Plowden, chairman-designate of the Atomic Energy Authority, which was about to take over responsibility for nuclear energy from the Ministry of Supply, to advise on what would have to be done to develop and manufacture these new weapons. After Churchill had taken the decision to go ahead, the Cabinet Secretary, Sir Norman Brook, called a meeting on 12 March to discuss the implications for foreign policy, defence strategy, the size and shape of the armed forces, civil defence policy and the atomic weapons programme. Those present were Plowden; two scientists, Sir John Cockcroft, the director of the Atomic Energy Research Establishment at Harwell, and Sir William Penney, the director of the Atomic Weapons Research Establishment at Aldermaston; and three officials from the Ministry of Defence. Penney explained the destructive power of the hydrogen bomb, and Brook briefed the Prime Minister on the policy adjustments that would be required. These matters were then discussed by senior ministers in the Defence Policy Committee, which was advised by the Chiefs of Staff, who in turn sought advice from Plowden, Cockcroft and Penney. Both scientific and professional advice followed on from Churchill's original, political decision after his discussion with Plowden in March.¹⁵ The decision to develop the bomb was confirmed by the Prime Minister in consultation with senior ministers in

¹⁴ Healey, *Time of My Life*, pp. 193–4, 198–9, 224–48, 252; Broadbent, *Military and Government*, p. 30. Broadbent was Healey's private secretary. For the development of the Ministry of Defence, see Peter Nailor, 'The Ministry of Defence, 1959–70', in P. Smith (ed.), *Government and the Armed Forces*, pp. 9–248, and Adrian Smith, 'Command and control in postwar Britain: defence decision-making in the United Kingdom, 1945–1984', *Twentieth Century British History*, 2 (1991), 291–327.

¹⁵ Peter Hennessy, *The Secret State: Whitehall and the Cold War* (London: Penguin Books, 2003), pp. 50–8; Arnold, *Britain and the H-Bomb*, pp. 51–7.

an *ad hoc* body, the Defence Policy Committee, on 16 June 1954. Unlike Attlee, Churchill also consulted the full Cabinet at three meetings on 7, 8 and 27 July, but without disclosing the full cost, perhaps because it was not known.

Normally the role of officials was to ensure that decisions were taken by ministers in an orderly way, but inevitably officials' briefs drew ministers' attention to discrepancies in expert advice, and some officials, of whom Brook was one, and his successor as Cabinet Secretary, Sir Burke Trend, another, could be influential advisers on their own account. Brook had acquired considerable influence over Churchill and became accustomed to putting forward his own opinions in the briefs that he prepared for prime ministers. On the other hand he was unable to dissuade Eden from what he (Brook) considered to be the folly of the Suez operation. Trend was said by Lord Rothschild in 1970 to be one of the two men who ran the country, the other being Sir William Armstrong, the permanent secretary of the Treasury. Trend was a great believer in the Anglo-American special relationship, and this is reflected in the advice that he gave Harold Wilson, of whom he was a close confidant.¹⁶

The Treasury began to exercise more effective control of defence expenditure as the annual debate over the estimates was supplemented by long-term planning. In April 1958 the Ministry of Defence agreed that future expenditure would be considered on the basis of three-year programmes, with long-term costings to take account of likely increases in pay and prices. From 1961/2 planning was on a five-year basis, and it was possible for the government to set a target for defence expenditure as a percentage of GNP far enough ahead for the necessary policy changes to be implemented. Sir Richard Clarke, the Treasury official who was responsible more than any other for the introduction of this system of 'forward looks', thought that it depended upon a willing partnership between the Admiralty, the War Office, the Air Ministry, the Ministry of Aviation, the Ministry of Defence and the Treasury (and in some matters the Atomic Energy Authority). The key relationship was between the two departments with the co-ordinating role: the Ministry of Defence, responsible for deciding priorities and allocating resources between the defence departments, and the Treasury, responsible for finance, including the phasing of expenditure over time and ensuring that departments got the best value for money.¹⁷

¹⁶ Peter Hennessy, *Whitehall* (London: Secker and Warburg, 1989), pp. 147–8, 167, 212–18.

¹⁷ Sir Richard Clarke, 'The control of defence expenditure: memorandum by the Treasury', n.d., but c. 1960, CLRK 1/3/1/1, Churchill College, Cambridge; G. R. M. Hartcup, 'History of the defence budget, 1946–1971', T 267/23, TNA.

As always, much depended upon individual personalities, not least those of prime ministers. Churchill had suffered a massive stroke in 1953 but he reserved his remaining strength for defence and foreign policy, and whatever one thinks of his decisions, he was at least decisive. Eden was unable to delegate detailed matters to departmental ministers and had a tendency to be indecisive, and even a sympathetic biographer has referred to his 'temperamental inaptitude for the supreme office'.¹⁸ Macmillan had a grasp of economic issues and had the patience to pursue goals over a long period, as his efforts to reform the central organisation for defence show. One of his leading opponents, Harold Wilson, commented that few prime ministers had worked so hard or had so wide-ranging a grip on every aspect of government.¹⁹ Sir Alec Douglas-Home had little time as prime minister in 1963–4 in which to have an impact. Wilson, according to Healey, interfered in the work of colleagues and lacked any long-term goals, but gave Healey 'a pretty free hand' in defence, except when a crisis threatened the government.²⁰ Relations between the Chiefs of Staff also depended on personalities. Mountbatten, both as first sea lord (1955–9) and CDS (1959–65), was deeply distrusted by successive heads of the air force and army, who felt, not without reason, that he pursued the interests of the navy at the expense of their services, even when he was supposed to be above inter-service rivalries. Mountbatten's love of intrigue and his superior access to politicians, on account of his social connections, intensified the CAS and CIGS's sense of grievance.²¹ This fissure in the ranks of government's professional advisers gave politicians more scope for making changes in policy that did not treat all three services equally.

Nuclear weapons

Policymaking was not made any easier by the rapidity of technical change in nuclear warfare, on the one hand, and by the slowness of the development of British delivery systems, on the other. The first examples of Blue Danube, the production model of the British atomic bomb, were delivered to Bomber Command's Armament School in November 1953 to enable RAF personnel to be trained in their storage, service and use. It would have been possible to adapt the ageing Lincoln piston-engined bombers to carry Blue Danube, but the decision was taken to

¹⁸ Victor Rothwell, *Anthony Eden: A Political Biography 1931–57* (Manchester University Press, 1992), p. 165.

¹⁹ Harold Wilson, *A Prime Minister on Prime Ministers* (London: Weidenfeld and Nicolson: Joseph, 1977), p. 326.

²⁰ Healey, *Time of My Life*, p. 331. ²¹ Ziegler, *Mountbatten*, pp. 528, 586.

wait for the first of the jet medium bombers, which began to enter service in 1955. It could be said that the RAF had atomic bombing capacity from July of that year, but a series of tests with unarmed bombs was conducted to check Blue Danube's safety and accuracy as a free-falling weapon before the first live test in October 1956.²² Blue Danube was too big for the Canberra light bomber, but the Canberra could deliver the 2,000-pound, kiloton Red Beard 'tactical' atomic bomb which was issued to squadrons in 1958. A naval version of Red Beard went into production in 1959, enabling carrier-borne aircraft to attack targets such as submarine bases or Soviet cruisers.

The American decision in 1954 to deploy tactical atomic weapons in Europe required an easing of the McMahon Act in order for their characteristics to be passed to NATO allies. However, Britain was not content to be treated as just one among a number of allies, and aspired to a bilateral relationship with the United States. When in 1956 American defence planners wanted to deploy Thor intermediate-range ballistic missiles (IRBMs) in Britain and other countries within range of targets in the Soviet Union, Anglo-American negotiations were protracted because the British insisted that the missiles be subject to dual controls and not committed to the SACEUR. The successful launching of the first Soviet space satellite on 4 October 1957 demonstrated that the United States would soon be vulnerable to Soviet intercontinental missiles (ICBMs), leading Sandys to hope that the 'powerful psychological shock' would reduce American doubts about the wisdom of nuclear co-operation with Britain.²³ By 1957 the British also had something to contribute in exchange for American nuclear know-how: first, an operational nuclear deterrent force, making joint planning on targets a practical issue; and, second, knowledge derived from the first British hydrogen bomb test series in May and June. On 25 October the American and British governments agreed a 'Declaration of a Common Purpose', in which they stated their intention to collaborate on nuclear weapons. Discussions between the USAF and the RAF in November resulted in a joint strategic plan that avoided duplication of targets. The agreement on joint Anglo-American control of Thors in Britain followed on 22 February 1958. The big prize for the British, however, came on 3 July 1958, with the 'Agreement for Co-operation on the Uses of Atomic Energy for Mutual Defence Purposes', which provided for the exchange of information on the design and production of nuclear warheads and

²² Wynn, *RAF Strategic Deterrent*, pp. 92–9.

²³ Duncan Sandys to Sir Richard Powell, permanent secretary, Ministry of Defence, 8 Oct. 1957, Duncan Sandys papers (DSND) 6/6, Churchill College, Cambridge.

the exchange of fissile material. The agreement proved to be the beginning of a lasting nuclear relationship, but Ian Clark has challenged the commonly held assumption that American willingness to share nuclear secrets was a result of the British hydrogen bomb tests. His alternative explanation is that the American government saw no sense in Britain wasting research and development resources on duplicating what the Americans had already done.²⁴ This explanation would fit in with American concern that the 1957 Defence White Paper indicated an intention to reduce Britain's defence effort.

The requirements for megaton warheads identified in advance of the British thermonuclear tests at Christmas Island in 1957–8 included a free-falling bomb and a powered, guided bomb, both to be carried by medium bombers, and a warhead for a medium-range ballistic missile. Blue Danube bomb-casings were used and the outcome was a device suitable for use as a free-falling bomb, but not for a powered bomb or a ballistic missile. Blue Danube weighed 10,000 pounds; Violet Club, an interim, experimental megaton bomb, which was issued in small numbers and under severe operational limitations in March 1958, weighed 9,000 pounds; and Yellow Sun Mark 2, the definitive megaton bomb, which entered service in 1961, weighed 7,000 pounds. A lighter warhead was required for powered bombs and ballistic missiles, and one of the early benefits of Anglo-American collaboration was access to the design of the American Mark 28 warhead, which was just going into production in 1958. It was economical in its use of scarce fissile material, and was suitable for use in free-falling bombs, powered bombs and ballistic missiles, and its variable yield (up to 1.1 megatons) meant that it could also be used for tactical weapons. A British version of the Mark 28, known as Red Snow, was ready for production in 1960, the expected date when the first British powered bomb, Blue Steel, would enter service, but Blue Steel did not become operational until December 1962.²⁵

The nature of thermonuclear war was made all too clear in the highly secret report of the Strath Committee in March 1955 on the home defence implications of thermonuclear weapons. William Strath had been seconded from the Treasury's Central Economic Planning Staff to set up the War Plans Secretariat, and his colleagues on the committee included representatives of the Chiefs of Staff, the Ministry of Defence (the Chief Scientist, Sir Frederick Brundrett, and the Deputy Secretary, Sir Richard Powell), and the Home Office, including the Director-General of

²⁴ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain's Deterrent and America 1957–1962* (Oxford: Clarendon Press, 1994), esp. pp. 104–6.

²⁵ Arnold, *Britain and the H-bomb*; Wynn, *RAF Strategic Deterrent*, pp. 222, 235, 247–51, 262.

Civil Defence, Sir Sidney Kirkman. The Strath Committee was able to draw upon advice from the Joint Intelligence Committee, which in turn drew upon American sources, since Britain had yet to develop a hydrogen bomb. Ministers were advised that, if no civil defence measures had been taken beforehand, ten 10-megaton bombs dropped on the United Kingdom would cause up to 12 million deaths, including 3 million from radiation. There would be a further 4 million serious casualties, which would be more than surviving hospitals could cope with. A single bomb could destroy any city, except Greater London, starting up to 100,000 fires within a circumference of between 60 and 100 miles. Half of the country's industrial capacity would be destroyed; the distributive system would break down; utilities would be severely dislocated; and water and food would be contaminated. The Strath Committee itself drew the conclusion that the government should try to reduce the impact of a thermonuclear attack by organising evacuation of the population from areas likely to be targeted and by constructing shelters. However, the Home Office's proposals to spend £1,250 million on civil defence met with the response from the Chiefs of Staff that the money would be better spent on the nuclear deterrent, and in December 1955 the Defence Committee agreed that 'the financial and economic situation precluded a programme for the construction of domestic shelters at public expense'.²⁶

In September 1958, during attempts to reduce the burden of defence expenditure on the economy, the Prime Minister, Macmillan, noted in the Defence Committee that the current annual level of expenditure of £14 million on civil defence made little provision for providing food and water, and that it was illogical to try to increase the number of people who would survive the immediate effects of a nuclear attack if they were to die subsequently from starvation, thirst and disease. On the other hand, to add survival measures to existing preparations would increase expenditure to £50 million a year. If the government were to admit that it was impossible to make effective provision for survival, the logical course of action would be to spend nothing, but he doubted whether it was practicable, politically, to deny publicly all responsibility for the fate of the population. Continuing the present level of expenditure, he suggested, 'would enable a façade of civil defence preparations to be maintained'. His colleagues agreed that no increase in expenditure could be contemplated, but that a reduction would be likely to 'provoke discussion of an issue to which public opinion appeared at present to be remarkably indifferent'. The Campaign for Nuclear Disarmament

²⁶ Hennessy, *Secret State*, pp. 133–45, 148.

(CND) had been formed in January 1958, but its influence was apparently discounted in Whitehall. The Committee agreed to continue the civil defence programme in order to 'maintain morale' rather than to provide effective protection against nuclear attack.²⁷ British governments made no attempt to follow the examples of Norway, Sweden and Switzerland, which had shelter programmes designed to protect a high proportion of their populations. Indeed, as part of the cuts in public expenditure to protect sterling, expenditure on civil defence was reduced after 1965 from £22 million a year to between £7 million and £8 million, the latter level being enough only for care and maintenance of the organisation that had been created by 1969.²⁸

Air weapons

The argument that there was no effective defence against a thermonuclear attack could also be directed against Fighter Command. It will be recalled that the Global Strategy paper of 1952 had placed a high priority on air defence, despite the new doctrine that enough *atomic* bombers would get through to inflict devastation, and super-priority had been given in 1952 to the production of jet fighters (see pp. 256, 266–7). However, the American tests in 1954 led the Chiefs of Staff to the conclusion that hydrogen bombs would be so devastating that even an air defence system that shot down a high percentage of attacking bombers could not protect the United Kingdom, and would be useless against ballistic missiles.²⁹ Macmillan came to believe that the air defence of the United Kingdom, insofar as it was practicable at all, would depend less and less upon manned fighters, which the Air Ministry had ordered in large numbers, and more and more on guided missiles.

Problems with the development of fighter aircraft further weakened the case for big orders. The government had to publish a White Paper in February 1955 explaining why the Swift had been a failure as an interceptor.³⁰ Even in 1956 the Hunter had problems with its guns, and the Javelin night and all-weather fighter had a tendency to inadvertent spinning at operational speeds. By the time of the Javelin's delayed entry into service that year it was described by the Minister of Defence as being

²⁷ Defence Committee minutes, 10 Sep. 1958, CAB 131/19, TNA.

²⁸ David Miller, *The Cold War: A Military History* (London: John Murray, 1998), pp. 149–54; Hennessy, *Secret State*, p. 149.

²⁹ 'United Kingdom defence policy', C (54) 249, 22 July 1954, CAB 129/69, TNA.

³⁰ *The Supply of Military Aircraft* (Cmd 9388), PP 1954–55, x. 511–22, paras. 25, 30.

able to give 'adequate service' for only 'two or three years'.³¹ The Defence Committee had agreed in July 1955 that Britain was falling behind the Americans and Russians in the development of military aircraft, and that it would be necessary to concentrate on a smaller number of projects than hitherto, perhaps even abandoning further development of manned fighter aircraft (although the minutes noted that such a decision would be 'drastic').³² By November 1955, Eden had accepted that there was a *prima facie* case for economising on expenditure on fighters rather than on bombers, but he still envisaged a Fighter Command of about 400 aircraft (compared with the existing planned strength of 576) rather than no Fighter Command at all.³³

Macmillan, as chancellor of the exchequer, was prepared to go much further in January 1956, advocating the abolition of Fighter Command.³⁴ When preparing his budget, he warned Eden that deflationary increases in taxation ('already painfully high') would be necessary if government expenditure were not reduced. Macmillan continued: 'it is defence expenditure which has broken our backs ... [and] we get no defence from the defence expenditure. When the story of the aeroplanes finally comes out, it will be the greatest tragedy, if not scandal, in our history'.³⁵ In May and June 1956 he used an enquiry, chaired by Eden, into the aircraft programme to press for the abolition of Fighter Command. Britain, Macmillan argued, could not afford to maintain present levels of expenditure on air defence, the nuclear deterrent, and forces to defend supplies of oil in the Middle East and rubber in Malaya. If Fighter Command could not provide effective defence against Soviet bombers (and later guided missiles) in a global war, and had no part to play in other types of war, the government could not justifiably continue to divert brains, skill and materials from more profitable activities in order to develop new types of fighter aircraft.³⁶

The future of Fighter Command was placed on the agenda of a defence policy review. There were two supersonic day-fighters under

³¹ 'Military aircraft programme', DC (56) 9, 26 May 1956, para. 19 (words underlined by Eden), PREM 11/1712. For Hunter's problems with its guns, see Walter Monckton (minister of defence) to Prime Minister, 12 July and 23 Aug. 1956, PREM 11/1712, TNA. Eden commented on the first of these minutes: 'a melancholy story. What will happen to our name and fame when all this is known, as I fear it must be, among our allies?'

³² Defence Committee minutes, 11 July 1955, CAB 131/16, TNA.

³³ Defence Committee minutes, 4 Nov. 1955, CAB 131/16, TNA.

³⁴ *Macmillan Diaries 1950-57*, pp. 529, 531.

³⁵ Macmillan to Eden, 23 Mar. 1956, PREM 11/1326, TNA.

³⁶ Gen 514, 2nd meeting, 31 May 1956, and Chancellor's notes on 'Military aircraft programme', 4 June 1956, PREM 11/1712. TNA.

development in 1956: the English Electric P.1, the prototype of which had flown two years earlier and which was due to enter service with the RAF in 1959, and which eventually did so in 1961; and the Saunders-Roe P.177, which had not yet flown, but which had a novel design incorporating a rocket as well as a jet engine and which was intended to fulfil RAF and Admiralty requirements for a high-altitude interceptor in 1960. The development of the P.177 was subject to strict cash limits because the Treasury would not approve an increase until ministers had completed reviewing the aircraft programme. The RAF dropped the P.177 as a result of the 1957 Defence White Paper but the First Sea Lord, Mountbatten, argued that if the P.177 was cut from the navy's programme the fleet would be in the 'ridiculous position' of being unable to defend itself against the up-to-date aircraft that the Soviet Union could be expected to supply to countries with which Britain might be engaged in a limited war. Nevertheless, Sandys decided in October 1957 that a new naval fighter could not be afforded and, once it became apparent that West German interest in the P.177 would not lead to an order, the project was cancelled.³⁷

There were also two projects for night and all-weather fighters: a new variant of the Javelin which, being subsonic, was considered to be of limited value and likely to be subject to delay, and was consequently dropped; and a design for Operational Requirement (OR) 329, which was still on the drawing board. A gap was anticipated between the existing Javelin becoming obsolescent and OR 329 becoming operational, and consideration was given to ordering a Canadian supersonic aircraft, the CF-105. Nigel Birch, the secretary of state for air, thought in March 1956 that such a step would 'have a most salutary effect on the British aircraft industry', besides reducing the research and development budget.³⁸ It was assumed that the CF-105 would have to be 'anglicised' by being given British rather than American engines and avionics, and the Ministry of Supply considered that the British aircraft industry could not cope with both the CF-105 and OR 329. In the event neither project survived the defence policy review. Surface-to-air (SAM) guided missiles were under development and the RAF's Bloodhound was due to

³⁷ Minister of Defence to Minister of Supply, 17 Oct. 1957, DSND 6/6, and Sandys to Prime Minister, 14 Nov. 1957, DSND 6/7, Churchill College, Cambridge; unsigned copy of letter from Mountbatten to Sir Frederick Brundrett, Mountbatten papers (MB) 1/1106, Hartley Library, Southampton University. The story of the project can be followed in the Treasury's file on 'Aircraft research controls: Saunders-Roe P.177', T 225/646, TNA.

³⁸ Birch to Walter Monckton (minister of defence), 20 Mar. 1956, DEFE 7/1128, TNA. Information about aircraft projects drawn from same file. For the Defence Committee decision, see minutes of meeting on 2 Oct. 1956, CAB 131/17, TNA.

enter production in 1957, but the Air Ministry did not expect these new weapons to 'contribute significantly' to the air defence of the United Kingdom until 1965 and argued that manned fighters would still be required after that date.³⁹ Nevertheless, Sandys' Defence White Paper announced in April 1957 that missiles would replace manned fighters in due course, and that all fighter projects apart from the P.1 would cease. A much reduced Fighter Command was given the restricted task of protecting the bomber bases of the nuclear deterrent.⁴⁰

The debate about the role of fighters continued through 1957–8. The Air Staff emphasised the limited operational effectiveness of the Bloodhound SAM, and pointed out that even more advanced missiles would lack the range to deal with stand-off aircraft launching flying bombs from off shore or jamming radar and other electronics in the air defence system. Sandys sought advice from Brundrett, the chief scientist at the Ministry of Defence, and was told there was no hope of fighters preventing devastation by a determined enemy armed with hydrogen bombs. Brundrett believed that no Soviet attack on the United Kingdom would occur until the Russians were in a position to launch a simultaneous attack on the United States, with 1962 being the best estimate. By 1963, he thought, it should be possible to deploy guided SAMs that would be more efficient than any fighters, and he recommended that Fighter Command, which cost £80 million a year, not including research and development, should be scrapped, with some of the resources saved being used to develop an efficient system based on missiles. The CAS, Sir Dermot Boyle, argued for a fighter force of 280 aircraft to guard against a surprise, pre-emptive attack on the deterrent, as well as against stand-off aircraft, and to provide a strategic reserve for overseas operations. Sandys referred the matter to the chairman of the Chiefs of Staff Committee, who happened to be an airman, Marshal of the Royal Air Force Sir William Dickson. Dickson discounted the danger of surprise attack, but accepted the CAS's other arguments and advised that it would be possible, on military grounds, to defend a reduction to 168 aircraft as soon as an effective missile system was in place.⁴¹ Sandys had been keen to disband all fighter squadrons in the United Kingdom that were not required for operational training and

³⁹ 'The CF-105 and P.177 in the air defence of the United Kingdom', 5 Apr. 1956, DEFE 7/1128, TNA.

⁴⁰ Cmnd 124, paras. 17, 62.

⁴¹ 'The air defence of the United Kingdom', n.d., but position in file indicates Sep. 1957; Brundrett to Sandys, 'Air defence – to be or not to be', 25 Sep. 1957; Dickson to Sandys, 'Retention of fighters for defence of the deterrent', 24 Nov. 1958, DEFE 7/970, TNA.

backing for overseas fighter squadrons. However, Macmillan found the Secretary of State for Air, George Ward, and the CAS 'in a very excited, resigning mood' at the Defence Committee on 23 December 1957 and it was agreed on the 31st that manned fighters must for the present be retained in the United Kingdom for defensive purposes.⁴²

The P.1 was a successful interceptor but when Healey became minister of defence in 1964 he found overseas forces still relying on the obsolescent Hunter as a tactical fighter-bomber. On Air Staff advice, he ordered the American McDonnell Phantom, a land-based or shipboard aircraft capable of both the interceptor and strike roles. Despite the prognostications of the 1957 White Paper and Brundrett's advice, no major air power relied completely on SAMs, partly because missile systems can be evaded by low-flying or stand-off aircraft, and partly because the fighter has additional air-superiority and tactical support roles. Moreover, from the late 1950s manned fighter aircraft were armed with air-to-air guided missiles and provided a more flexible defence system than SAMs, which were analogous with anti-aircraft guns in their limited mobility. Although SAMs became an essential part of an air defence system, air forces comparable in size to the RAF were largely equipped with fighters or fighter-bombers, and the RAF's balance of bombers to fighters was anomalous even in comparison with the superpowers.

The notion that thermonuclear weapons would provide a cheap, long-term deterrent was put forward by the Air Defence Sub-Committee in July 1954: once both sides had sufficient nuclear weapons to annihilate the other, there would be no need to build more.⁴³ While this argument was true of thermonuclear warheads, it was not true of the delivery systems available in the 1950s. Aircraft were vulnerable to interception, and land-based missiles to a pre-emptive strike, unless placed in underground silos. Deterrence based on fear of mutual destruction depended on the development of an invulnerable delivery system, and the technical problems of maintaining the credibility of the deterrent proved to be a continuing strain on research and development resources. Development of medium bombers to carry nuclear bombs was delayed by a shortage of scientific personnel, and this problem was made worse by the decision to produce two definitive types: the Avro Vulcan and the Handley Page Victor, which entered service in 1957 and 1958 respectively, in addition to the interim Vickers Valiant in 1955 (all three being

⁴² Sandys to Secretary of State for Air, 26 Nov. 1957, DSND 6/7, and Sandys to Prime Minister, 28 Apr. 1958, DSND 6/12, Churchill College, Cambridge; Harold Macmillan diary, 23 Dec. 1957, Bodleian Library, Oxford.

⁴³ Baylis, *Ambiguity and Deterrence*, p. 189.

known collectively as V-bombers). The Select Committee on the Estimates enquiring in 1956 into the supply of military aircraft was persuaded by witnesses from the Air Ministry and the Ministry of Defence, and the head of Handley Page, that the decision to develop the Vulcan and Victor to the same operational requirement was justified by the need to ensure that the best design was available for what was, after all, the most important aspect of defence policy.⁴⁴ However, this argument overlooked the insurance provided by the Valiant, which overlapped in its period of service with the Vulcan and the Victor, and which was broadly as satisfactory as the Mark I versions of these aircraft until it developed metal fatigue problems in 1964. The Select Committee also neglected the problem of obsolescence. With hindsight, one can see that it might have been better to employ scarce research and development resources on the problem of extending the effectiveness of the deterrent in the 1960s rather than in producing two medium bombers to the same specification.

In the mid-1950s it was reasonable to assume that a medium bomber, equipped with radio countermeasures, and flying just below the speed of sound, could evade interception, especially given the vast air space that the Soviet air force had to defend. However, thought was being given as early as 1955 to how to extend the V-bombers' operational effectiveness against improvements that could be expected in Soviet air defences by 1960.⁴⁵ It was proposed to replace free-falling bombs with a rocket-powered, guided bomb with a range of a hundred miles. A development contract for this weapon, Blue Steel, was placed in March 1956 but there were delays, partly because the main contractor, A. V. Roe, had no previous experience of designing and manufacturing missiles. Even after Blue Steel was accepted into service in December 1962 there were doubts about its effectiveness. By 1962 Soviet air defences had improved so much that the Mark 2 V-bombers, which had entered service in 1960–1, would find it difficult to penetrate to within a hundred miles of many of their targets. Moreover, the best way in which to protect the deterrent from a pre-emptive attack by Soviet bombers or long-range rockets was for the V-bombers to take off within minutes of a warning that such an attack was coming, but Blue Steel, with its liquid-fuelled rocket engine and elaborate guidance system, was much harder to maintain in a state of readiness than a free-falling bomb.

The idea of supplementing the V-bombers with surface-to-surface ballistic missiles with a range of 1,000 miles had led in 1955 to an

⁴⁴ Select Committee on the Estimates, *The Supply of Military Aircraft*, PP 1956–57, v. 351, paras. 46–52.

⁴⁵ Much of what follows is based on Wynn, *RAF Nuclear Deterrent*.

operational requirement for what became the Blue Streak IRBM. Blue Streak was similar to the American Thor missiles. However, whereas Thor was stationed above ground, Blue Streak was to be deployed in underground sites. Inevitably a missile system operating from fixed sites lacked the flexibility of manned bombers, and the Air Ministry did not anticipate dispensing with the latter. In July 1957 Blue Streak was regarded in the Air Ministry as the most important military project in the country, but by mid-1958, in the light of the Anglo-American Thor agreement, questions were being asked in the inter-service Defence Board about whether it would be cheaper to obtain Thor without political restrictions, and to use research and development resources thereby released from the Blue Streak project to collaborate with the Americans on a Polaris-type, solid-fuel rocket. Like Thor, Blue Streak used a liquid propellant and took longer to prepare for take-off (increasing its vulnerability to a pre-emptive strike) than a solid-fuel rocket would do. In September 1958 the Minister of Supply was asked by the Cabinet's Defence Committee to arrange for work on Blue Streak to be unobtrusively retarded.

In mid-1959 the Minister of Defence, Sandys, on the advice of his permanent secretary, Powell, established an independent British Nuclear Deterrent Study Group, with representatives of the three services, the Foreign Office and the Treasury, under Powell's chairmanship. The group compared Blue Streak with two American ballistic missiles, the submarine-launched Polaris and the air-launched Skybolt. Rising estimates for the costs of research and development and of underground silos hardened the Treasury's opposition to Blue Streak, and the Chiefs of Staff were in favour of a mobile system. Once President Eisenhower had indicated to Macmillan in March 1960 that Skybolt would be available on satisfactory terms, the Defence Committee took the decision to cancel Blue Streak as a weapons system. The vulnerable Thors were taken out of service by the end of 1963.

The long-term viability of the V-bomber force depended upon American willingness to continue with the development of Skybolt because the Hound Dog stand-off cruise-type missile, which was currently in USAF service with Boeing B-52 heavy bombers, was too big for British medium bombers, and the British cancelled development of a longer-range version of the Blue Steel powered bomb. However, as early as October 1960 the Chief Scientific Adviser at the Ministry of Defence, now Sir Solly Zuckerman, was expressing fears about the future of the Skybolt programme. The Minister of Defence, Watkinson, asked Mountbatten, as CDS, for advice on the relative merits of Polaris and a British powered-bomb project, Pandora, which could be launched by a supersonic bomber being developed for the RAF, the TSR-2. Mountbatten said he could not

see how the government could gamble again on a weapons system that had yet to leave the drawing board and he strongly recommended that the dollars that the Treasury had earmarked for Skybolt should be used to purchase Polaris should Skybolt fail. Polaris, he pointed out, would remain a viable deterrent for twenty or thirty years as there was no prospect of a breakthrough in anti-submarine warfare to counter its second-strike capability.⁴⁶ When told by President John F. Kennedy at the Nassau conference in December 1962 of the Pentagon decision to cancel Skybolt, Macmillan insisted that Polaris be made available instead. However, there remained the problem of how to stretch out the effectiveness of the V-bombers, as British Polaris submarines could not be operational before 1968 or 1969. The Air Staff decided that from 1965 V-bombers would have to fly low below enemy radar, using modified Blue Steel missiles, although both bombers and missiles had been designed originally to operate at high altitudes. In the event, successful low-level firings of Blue Steel were not achieved until 1967, only two years before the V-bomber deterrent was replaced by Polaris.

The TSR-2 was planned to replace the Canberra light bomber from 1965. Although explicitly not intended to replace the V-bomber, the TSR-2 was designed to be capable of long-range penetration of enemy territory, as well as of a short-range strike/reconnaissance role, and, like the Canberra, it would have nuclear capability. The TSR-2 was a very advanced aircraft and so expensive as to be an obvious target for the Treasury. Estimates of the research and development costs rose from about £90 million in September 1960 to between £175 million and £200 million in May 1963, and to between £240 million and £260 million twelve months later. When Healey became defence minister in October 1964, he discovered that TSR-2, which had begun its flight trials only the previous month, required at least three years' more development before it could be operational. He persuaded the Air Staff to forgo TSR-2 by promising to purchase the contemporary American F-111 tactical strike aircraft in its place, but pressure to reduce defence expenditure in the wake of sterling devaluation led to the cancellation of the F-111 order in 1968.⁴⁷ The RAF continued to operate the obsolescent Canberra into the 1980s.

⁴⁶ Harold Watkinson to CDS, 31 Oct. 1960; Mountbatten to Zuckerman, 1 Nov. 1960, and 'Record of conversation between the Minister and the CDS on 15 November 1960', MB 1/J311, Hartley Library, Southampton University.

⁴⁷ Healey, *Time of My Life*, p. 273; Sean Straw and John W. Young, 'The Wilson government and the demise of TSR-2, October 1964–April 1965', *Journal of Strategic Studies*, 20 (1997), no. 4, 18–44; Wynn, *RAF Nuclear Deterrent*, pp. 501, 504, 523–43.

There were other examples of cancelled projects and of the RAF and FAA having to rely upon obsolescent aircraft. Despite growing emphasis on air mobility for the army as an alternative to reliance on fixed bases abroad, the RAF lacked a satisfactory long-range transport aircraft until Healey bought the American Lockheed Hercules 'off the shelf' in 1965 at a third of the unit cost of the British HS-681 project. For maritime reconnaissance and anti-submarine warfare the RAF continued to use the Avro Shackleton, a piston-engined descendant of the Lancaster dating from the 1940s, which only began to be replaced by the Hawker Siddeley Nimrod, a development of the Comet airliner, in October 1969. The cancellation of the P.177 in 1957 left the FAA relying on the subsonic Sea Vixen all-weather fighter in the late 1960s, by which time the Soviet Union had supersonic strike aircraft in service. The P.1154 supersonic vertical-take-off-and-landing (VTOL) fighter project was cancelled in 1965 and replaced by the conventional American Phantom, but the latter's entry into service was delayed by the decision to fit it with a British engine. The FAA did receive a new shipboard strike aircraft in 1962, the Blackburn NA-39 Buccaneer. Designed in 1954 and first flown in prototype form in 1958, the Buccaneer was subsonic and relied upon flying low to evade radar detection. Mountbatten tried to persuade the RAF to adopt the Buccaneer instead of the more advanced, but much more expensive, TSR-2, but the Air Staff believed that the Buccaneer did not offer a sufficient improvement on the Canberra.⁴⁸

Naval weapons

The Buccaneer, with its capacity to carry nuclear weapons, was central to the Admiralty's vision of the aircraft carrier as the modern equivalent of the capital ship. In a remarkable paper, dated 2 March 1954, the Admiralty set out its views on expected trends in naval weapons down to the end of 1965.⁴⁹ The news of the American hydrogen-bomb tests came too late to influence the paper, which, however, assumed that atomic weapons would be plentiful; that the importance of air attack would increase; but that long-range detection of submarines and torpedo countermeasures would reduce the underwater threat to surface ships. It was predicted that by the 1960s carrier-borne aircraft would carry nuclear weapons and would contribute to the strategic air offensive; aircraft and 200-mile-range anti-ship missiles would have begun to

⁴⁸ Healey, *Time of My Life*, p. 272; Wynn, *RAF Nuclear Deterrent*, pp. 505–14; Ziegler, *Mountbatten*, pp. 553, 586–8.

⁴⁹ 'The Navy of the future', 2 Mar. 1954, ADM 205/102, TNA.

replace guns as offensive weapons; and new light fleet carriers would carry VTOL fighters to supplement ship-borne anti-aircraft missiles and to attack enemy airfields. It was expected that the number of aircraft carriers in commission would increase from the current total of six to nine in 1965: seven able to operate all naval aircraft, and two light fleet carriers for VTOL aircraft, with two more light fleet carriers building. In the event, there were only seven aircraft carriers in 1965, of which two were commando carriers, equipped with helicopters only, and VTOL aircraft with fixed wings had yet to enter service.

In line with the navy's long-standing preference for offensive rather than defensive measures against submarines, the paper predicted that the importance of convoy escort would decline over the next decade. Instead, the emphasis would be on the interception of enemy submarines by offensive patrols by surface vessels or anti-submarine submarines, and on air and missile attacks on enemy submarine bases. There was little in this vision for the traditional battleship, or even cruiser. It was expected that the total of these big-gun vessels, including those in reserve, would be reduced from twenty-eight in 1954 to seven in 1965. In the event there were no battleships and only five cruisers in 1965. The numbers of destroyers and escort vessels were also expected to fall, from a total of 257 in 1954 to between 160 and 185, including a new class of fleet and convoy air-control and air-warning ships. In the event, there were only ninety destroyers and frigates in 1965. The one category of ship that the 1954 paper predicted would increase markedly in numbers was coastal anti-mine vessels, but, as will be noted below, the Admiralty had to sacrifice this planned increase for financial reasons, and numbers fell from 214 in 1954 to 134 in 1965. It was expected, rightly, that ship-borne helicopters would come into service by the 1960s for both anti-submarine and anti-mine work.

In a particularly prophetic passage, the paper noted that the deployment of nuclear weapons at sea would present the Soviets with harder targets than vulnerable bases in the United Kingdom, and put forward 'the possibility of the development of ship-launched ballistic rockets of considerable range which will carry atomic warheads and land accurately'. These rockets might be launched by surface ships or submarines but, 'if the launching ship were submersible, her vulnerability to enemy attack would be reduced'. Nuclear-powered submarines might be operational by 1965. In presenting this vision of what the Polaris system was to achieve, the Admiralty was careful not to trespass too much on Air Ministry preserves. It was noted that seaborne ballistic missiles might have a range of 1,000 miles or less, and that 'the strategic air offensive will thus still primarily be conducted by aircraft'.

Aircraft carriers were large, expensive ships, and the cost of the FAA, £70 million in 1954, was of the same order as Fighter Command (£80 million in 1957). Unsurprisingly, both carriers and the FAA were the targets of economisers in Whitehall. In 1954 the Swinton Committee, which had been set up by Churchill to scrutinise the defence budget in the light of the advent of the hydrogen bomb, recommended that aircraft carriers be manned and equipped for an escort role only, and suggested an investigation into the future strategic role of the FAA and longer-term plans for the development of new types of naval aircraft. The Admiralty riposte was that only heavy fleet carriers, with their full complement of early-warning, anti-submarine, fighter and strike aircraft, could counter the threat to shipping from the Soviet surface fleet. The NA-39, the future *Buccaneer*, with its proposed 800-mile range for high-level anti-ship attacks and 400-mile range for low-level attacks on land targets, was ideal for both a major war and a limited war. It fell to Macmillan, who became minister of defence in October, to decide whether to support the carriers, and he did so, after the Admiralty had conceded economies by cutting its minesweeper programme.⁵⁰ Nevertheless, the growing size of naval aircraft and the need to fit SAM systems meant that replacement carriers would have to be larger and more expensive than the navy's existing carriers, and considerable difficulties were encountered between 1960 and 1966 in designing vessels that could be afforded with the funds likely to be available.⁵¹

Battleships survived the search for economies for longer than might have been expected. Perhaps in deference to Churchill's predilection for big guns, the Swinton Committee recommended that a reduction in the number of cruisers in commission from ten to eight be made to allow *Vanguard* to have a full crew complement. The Defence Committee decided in November 1954 that *Vanguard* should be retained in commission, and a long, active service seems to have been envisaged because she was sent for a major refit. However, it was the Admiralty that took the initiative in recommending in August 1955 that she be placed in reserve. The navy was short of manpower, and ratings with electrical skills were needed for HMS *Girdleness*, the ship that was to conduct trials for the 'all-important' Sea Slug SAM system. It would only be possible to bring *Vanguard* into commission by transferring the crews of two anti-submarine frigates, and the Admiralty advised against this

⁵⁰ See Grove, *From Vanguard to Trident*, pp.111–15, for a fuller account of this bureaucratic battle.

⁵¹ Anthony Gorst, 'CVA-01: a case study in innovation in Royal Navy aircraft carriers, 1959–66', in Richard Harding (ed.), *The Royal Navy 1930–2000* (London: Frank Cass, 2005), pp. 170–92.

course. Any sentimental attachment for battleships did not outweigh the priority given to anti-aircraft and anti-submarine warfare. The Admiralty advised the Defence Committee that *Vanguard* had 'undoubted' value against 'Sverdlov'-class cruisers and would still be available in reserve for this role. The future of battleships came up again at the Defence Committee in March 1956, when it was decided that the four 'King George V'-class battleships would be kept in extended reserve, but that three of them would have to be scrapped in a few years and only one would be preserved for longer by being 'cocooned'.⁵² It was only after the advent of Sandys as minister of defence in 1957 that the battleships succumbed to budgetary restrictions. The *King George V* and its sister ships were scrapped in 1957–8, and *Vanguard* followed in 1960. The French navy took the same view about the cost-effectiveness of battleships: its last two were paid off in 1959 and 1961 respectively.

With no battleships available, cruisers were the only big-gun vessels that could be used for 'showing the flag' in overseas stations. However, in discussion in the Defence Committee in November 1955 one minister (not identified in the minutes) asked whether modern destroyers were much less impressive than cruisers for this purpose.⁵³ The 'Darling'-class destroyers completed in 1952–4 displaced 2,800 tons, about half the size of a light cruiser of the 'Dido' class. The counter-argument offered by the Admiralty was that cruisers would be indispensable for launching ship-to-ship guided missiles. Britain had not completed any cruisers since 1945, but work had been resumed in 1954 on the 9,500-ton 'Tiger' class, using hulls launched in 1944–5. The Admiralty also wanted four completely new guided-weapons cruisers costing £15 million each. In the event the 'Tiger' class, completed in 1959–61, were the last big-gun ships built for the Royal Navy, armed with 6-inch automatic weapons, and as early as 1965 work was begun to convert them to helicopter carriers. The projected 18,000-ton missile cruisers were too expensive to find a place in the naval estimates. As the older cruisers were scrapped, general-purpose frigates of 2,300 tons were used for showing the flag. Considering that Sir John Fisher had thought in 1904 that ocean-going destroyers of about a third of that displacement would be adequate for the purpose,⁵⁴ it is hard to see this particular economy as evidence of decline. Moreover, once the Suez crisis in 1956 had shown the need for a maritime force capable of rapid reaction to

⁵² 'Defence policy', C (54) 329, 3 Nov. 1954, CAB 129/71; Defence Committee minutes, 25 Aug. 1955, CAB 131/16, and 2 Mar. 1956, CAB 131/17, TNA.

⁵³ Defence Committee minutes, 4 Nov. 1955, CAB 131/16, TNA.

⁵⁴ Sir John Fisher, 'Naval necessities', 21 Oct. 1904, FISR 8/4, Churchill College, Cambridge.

events, the navy converted two aircraft carriers as helicopter-equipped commando carriers and acquired up-to-date landing craft.⁵⁵

Escort vessels showed a tendency to increased size and sophistication that limited the numbers that the navy could afford. Most striking were the 5,200-ton 'County'-class destroyers laid down from 1959 to provide platforms for Sea Slug SAMs. These ships were light cruisers in all but name. In addition to missiles, they carried anti-submarine helicopters and 4.5-inch guns for shore bombardment. Anti-submarine warfare was being revolutionised by improved Sonar and by 1957 the Admiralty believed that hunter-killer submarines were the best means of destroying other submarines.⁵⁶ Submarine warfare was also revolutionised by the development of nuclear propulsion, which allowed vessels to undertake long cruises without refuelling or surfacing. The US Navy commissioned the *Nautilus*, the world's first nuclear-powered submarine in 1954, and one of the benefits of Anglo-American nuclear collaboration was the early transfer of this new technology. The first British nuclear submarine, HMS *Dreadnought*, laid down in 1959 and commissioned in 1963, used an American reactor and an American-designed propulsion system, but British reactors and British-designed machinery were used subsequently. *Dreadnought* was a 'hunter-killer', but it opened the possibility of the navy contributing to the nuclear deterrent along the lines envisaged in the navy's paper of 1954, in the form of the Polaris system.

Unlike the land-based, liquid-fuel Thor or Blue Streak, Polaris was largely invulnerable to a pre-emptive strike when at sea. When the Polaris agreement was made with the Americans in 1963, four 'Resolution'-class submarines, each capable of carrying sixteen missiles, were ordered, but a projected fifth boat was cancelled by the Labour government in 1965. Allowing for maintenance and refits, only one or two of the four could normally be kept on station at any given time. According to an unofficial estimate, two Polaris submarines could destroy ten Soviet cities, whereas the Air Staff's view in the 1950s had been that an adequate deterrent would have to be capable of destroying 40 of 131 major Soviet centres.⁵⁷ The Royal Navy's Polaris submarines appear to have fallen some way short of being an adequate deterrent on this definition, but they were in line with the concept of interdependence with the United States. The Admiralty was aware that Polaris would provoke a bureaucratic battle with the Air Ministry and crowd out the

⁵⁵ Ian Speller, 'Amphibious operations, 1945–1998', in Harding (ed.), *Royal Navy 1930–2000*, pp. 213–45.

⁵⁶ MISC/M (57) 91, minutes of meeting of 12 Aug. 1957, DEFE 7/968, TNA.

⁵⁷ Robert H. Paterson, *Britain's Strategic Nuclear Deterrent: From Before the V-bomber to Beyond Trident* (London: Frank Cass, 1997), pp. 45–6.

navy's surface ships, given budgetary pressures on the services. Consequently the Admiralty was unenthusiastic when the adoption of Polaris was first mooted in 1960, and the question of the price of the missiles was a central concern. However, the British were able to buy American-produced missiles at cost price plus a contribution of 5 per cent towards research and development. The construction of the 'Resolution'-class submarines went ahead rapidly: the first was laid down in 1964, and was on operational patrol in June 1968; the fourth was completed in December 1969, six months after the navy had officially taken over the deterrent role from the RAF.⁵⁸

Army weapons

The problem of finding the right balance of weapons systems appropriate to a 'hot', nuclear war and to a limited, conventional war was particularly acute in the case of the army. A Chiefs of Staff working party on the operational use of atomic weapons had concluded in 1952 that low-yield atomic weapons could be used to attack troop concentrations and thereby counter the Soviet advantage in land forces. The Americans deployed short-range Honest John and medium-range Corporal surface-to-surface nuclear missiles in Europe in the late 1950s and the British Army of the Rhine (BAOR) received these 'tactical' weapons in 1960, although the warheads remained under American control. Britain had begun to develop a tactical nuclear missile, known as Blue Water, but it was cancelled on financial grounds in 1962, despite successful tests. It was always unlikely that ministers would take the decision to embark on a nuclear war on account of a limited act of aggression. American, British and other NATO forces consequently found it difficult to incorporate tactical nuclear weapons into their plans because of uncertainty whether they would be allowed to use them.⁵⁹ Even in Europe there was a case for conventional forces that would delay Soviet land forces while resort to the nuclear option was suspended during negotiations. Conventional forces were in any case required for limited wars overseas.

⁵⁸ Clark, *Nuclear Diplomacy*, pp. 283–90, 380–2; Grove, *From Vanguard to Trident*, pp. 240–1.

⁵⁹ Lawrence Freedman, *Britain and Nuclear Weapons* (London: Macmillan, 1980), pp. 20–1; Martin S. Navias, *Nuclear Weapons and British Strategic Planning 1955–1958* (Oxford: Clarendon Press, 1991), pp. 88–90. For decisions in favour of acquiring American tactical missiles and warheads, see Kaoru Kikuyama, 'Britain and the procurement of short-range nuclear weapons', *Journal of Strategic Studies*, 16 (1993), no. 4, 539–59.

The prospect of nuclear warfare had implications for conventional artillery, and these were addressed by the War Office from 1955. Troops would have to be dispersed much more widely, and the 25-pounder gun, dating from the Second World War, lacked the necessary range for close support in attack or defence in depth. A high degree of flexibility would be required in either a nuclear or limited war. The number of new weapons systems was restricted, both to reduce unit costs in production and to simplify logistics.⁶⁰ All field and heavy artillery was converted in the 1960s to armoured self-propelled models. Likewise the 17-pounder anti-tank gun, which had been introduced into service in 1943, was supplemented and then replaced by guided missiles. The late 1950s also saw the development of a mobile SAM system, Thunderbird, for the army.

Considerable attention was paid to ensuring that British tanks could match Soviet models in combat. The Centurion proved to be capable of being upgraded with heavier armour and new, larger-calibre guns, and remained in production until 1962, by which time 4,423 had been made, of which 57 per cent were exported. The 105-mm L7 series gun used on later Centurions was so good that it was widely adopted by other countries for their tanks. The Centurion was supplemented in 1955 by the Conqueror, which had an American 120-mm gun to enable it to deal with the latest Soviet heavy tank. Only 180 Conquerors were built, and both it and the Centurion were replaced from 1967 by the Chieftain medium tank, which featured a new 120-mm gun. The development of the Chieftain was protected from defence cuts in 1963 on the grounds that the Centurion was by then obsolescent and orders for Chieftains might encourage other countries to adopt it. Subsequently over 900 were exported to Iran as well as small numbers to Oman. The Chieftain was described in the technical literature as having the most powerful armament and the best armour protection of all the tanks developed in the 1950s and produced in the 1960s.⁶¹

Most of the actual fighting by the army in a series of minor overseas conflicts, such as the confrontation with Indonesia, was done with small arms and required a high level of professionalism. The phasing out of conscription in the early 1960s – the last person on National Service returned to civilian life in 1964 – and the return to a long-service, professional army, albeit a small one, was also appropriate to an age of increasing sophistication in weaponry. The new-style army required the

⁶⁰ 'The close support artillery weapon in the infantry division', n.d. but 1956, and 'Future re-equipment of the Army', 30 May 1956, WO 32/15709, TNA.

⁶¹ Defence Committee minutes, 10 July 1963, CAB 131/28, TNA; *Jane's Armour and Artillery 1984–85*, pp. 87, 95.

Table 6.1. *UK share of export of manufactures from eleven industrial countries, 1954–69.*^a

	(%)
1954	20.5
1957	17.9
1960	16.3
1963	15.1
1966	13.2
1969	11.2

Note: ^a USA, Canada, UK, West Germany, France, Italy, Belgium, Netherlands, Sweden, Switzerland and Japan.

Source: London and Cambridge Economic Service, *The British Economy: Key Statistics 1900–1970* (1971), p. 17.

mobility conferred by air transport and helicopters, and was certainly not a cheap option.⁶²

The economy: relative decline and the weakness of sterling

Britain's economic problem in the 1950s and 1960s had three related aspects: first, a loss of share of world trade in manufactures (see table 6.1); second, a lower rate of growth of national income than other industrial countries; third, a balance of payments on current account that was not strong enough to sustain sterling's role as an international currency. The overall problem was how to make Britain sufficiently competitive in the international economy to enable her to maintain her influence in world affairs not only through armed strength but also through leadership of the Commonwealth and the sterling area.

The government's *Economic Survey* for 1954 commented on the keen competition in world trade in manufactured goods and the fact that West Germany was expanding her exports more rapidly than Britain. While rearmament had been a problem in 1950–3, the survey now identified the major factor affecting Britain's performance as the low level of demand in the sterling area, where countries producing primary goods had been adversely affected by the decline in prices after the boom caused by stockpiling during the early stages of the Korean War.⁶³ Previously Britain's connections with producers of primary products, through the Commonwealth and the sterling area, had seemed to be a

⁶² Carver, *Tightrope Walking*, pp. 62–8.

⁶³ *Economic Survey, 1954* (Cmd 9108), PP 1953–54, xxvi. 431, para. 71.

source of strength, enabling London to acquire dollars at a time of a world dollar shortage. By the mid-1950s the dollar shortage was easing. Moreover the fastest growing world markets were in trade between industrial countries. This trend proved to be a long-term one, partly because of post-war liberalisation of international trade through the General Agreement on Tariffs and Trade (GATT) and the Organisation for European Economic Co-operation (OEEC), and then, from 1958, the European Common Market; partly because industrial processes were becoming more economical in their use of raw materials, sometimes providing man-made substitutes (for example, artificial fibres for textiles); and partly because rising real incomes created faster-growing demand for manufactured consumer goods, such as cars or television sets, than for food. Despite the failures of Britain's applications to join the European Common Market in 1961–3 and 1967, the proportion of British exports going to Western Europe rose, and there was a marked reorientation of trade away from the Commonwealth after 1960, which may have made it easier for British governments to give up overseas defence commitments.

Economics and politics also intersected in Whitehall's perception in 1956 of the Soviet Union as a threat to Britain's share of international trade. In May of that year, when arguing that Britain could not afford a policy of perfection in defence, Eden noted that there was evidence that the Russians intended to concentrate on industrial exports. In order to be able to meet this competition, part of the burden placed on British industry by defence orders must be reduced, so as to release resources for civil production. In present circumstances, he said, economic failure was a more serious risk than global war, and defence plans had to be adjusted to this revised political assessment. He added that a recent report from the ambassador in Washington showed that President Eisenhower was thinking along the same lines.⁶⁴ The Russians made no secret of their intentions. In November 1957 Nikita Khrushchev, the Soviet leader, declared in a visit to the United States: 'in the peaceful field of trade we declare a war. The threat to the United States is not in the inter-continental ballistic missile but in the field of peaceful production. We are relentless in this and will prove the superiority of our system.'⁶⁵

⁶⁴ 'Cabinet: aircraft programme', note of meeting of ministers, 31 May 1956, Gen 514/2nd meeting, PREM 11/1712. Macmillan had sent a copy of an official steering committee report on 'The Soviet economic offensive' to Eden the previous month, and the report had been approved by the Foreign Secretary: Foreign Office records, series 371, file 120804 (FO 371/120804), TNA.

⁶⁵ Sir Leslie Rowan, *Arms and Economics: The Changing Challenge* (Cambridge University Press, 1960), p. 15. Rowan had been a senior Treasury official and was expressing a departmental view.

Table 6.2. *Comparisons of GNP of various countries with UK at current prices and exchange rates, 1954–69 (UK = 100)*

	France	West Germany	UK	USA
1954	64.0	74.0	100	730.0
1957	69.4	82.3	100	716.1
1960	83.3	98.6	100	709.7
1963	96.5	109.9	100	686.0
1966	100.9	115.0	100	699.1
1969	129.1	137.3	100	846.4

Note: The figures should be read horizontally, to compare *total* GNP (*not* per capita) in each year with the UK. The vertical figures do not measure growth, only change relative to British GNP. The sharp increase in the rate of relative decline of British GNP between 1966 and 1969 reflects the effects of devaluation of sterling on international comparisons based on current exchange rates.

Source: Calculated from figures in International Institute for Strategic Studies, *The Military Balance 1973–1974* (London: Chatto and Windus, 1974), p. 79.

Britain's economic problem was far greater than competition from any one particular country. The British economy was becoming relatively less important as other economies expanded more rapidly. The figures in table 6.2 comparing the size of the British national income with the size of other countries' incomes have to be treated with some care. They are calculated from a table published by the International Institute for Strategic Studies showing GNP in dollars at current market prices and exchange rates, and are for the whole economy. The figures thus reflect the growth of populations as well as of output per person. In the period 1950–73 British GDP per person grew by an annual average of 2.5 per cent, higher than at any time previously, but other economies enjoyed higher rates: 5.0 per cent in the case of West Germany and 4.1 per cent in the case of France.⁶⁶ The diminishing importance of Britain as a world power was also a consequence of a relatively slow growth in population (see table 6.3). As a result of these trends, the West German and French economies became bigger than the British in 1961 and 1966 respectively.

A large part of the discrepancy in international growth rates of GDP per person could be explained by the fact that in the late 1940s the average British worker's productivity was closer to the American level than the average continental European worker's productivity was. In the 1950s and 1960s there was a convergence of productivity as firms followed best American practice, and continental countries had more

⁶⁶ Maddison, *Phases of Capitalist Development*, p. 44.

Table 6.3. *Populations of various countries, 1959 and 1970*

	(millions)				
	France	West Germany	UK	USSR	USA
1959	45.2	54.9	52.2	208.8	177.8
1970	50.8	60.7	55.5	241.7	204.9

scope for improvement. Unlike Britain, European economies had large, backward agricultural sectors from which workers were released into higher-productivity employment in industry and services by modernisation of farming. However, there was more to the story of relative economic decline than convergence to a common level of productivity. By the late 1960s output per person employed in Britain was somewhat lower than elsewhere in Western Europe, and it has been argued that this difference reflected greater resistance to change in institutions and work practices than on the Continent.⁶⁷

From the late 1950s the publication of international league tables of economic growth heightened political awareness of Britain's relatively poor economic performance.⁶⁸ In 1961 Macmillan adopted what was thought to be the French system of indicative planning for promoting growth in a capitalist economy, creating the National Economic Development Council (NEDC). It was hoped that the NEDC, by bringing representatives of employers' organisations and the Trades Union Congress together with ministers and their officials, would be able to identify obstacles to investment and improved productivity, and that employers and trade unionists would co-operate in removing these obstacles with a view to mutual benefit through higher economic growth. In fact the French Commissariat Général au Plan exercised less authority than British officials supposed, and in any case the British state

⁶⁷ Charles Feinstein, 'Benefits of backwardness and costs of continuity', in Andrew Graham and Anthony Seldon (eds.), *Government and Economies in the Postwar World: Economic Policies and Comparative Performance 1945–85* (London: Routledge, 1990), pp. 284–93; N. F. R. Crafts, 'The golden age of economic growth in Western Europe, 1950–1973', *Economic History Review*, 48 (1995), 429–47. For resistance to change, see M. W. Kirby, 'Institutional rigidities and economic decline: reflections on the British experience', *Economic History Review*, 45 (1992), 637–60. For a critical review of the debate among economic historians and a wide range of data, see Michael J. Oliver, 'British economic policy and performance since 1950: an early twenty-first-century assessment', in Michael J. Oliver (ed.), *Studies in Economic and Social History: Essays in Honour of Derek H. Aldcroft* (Aldershot: Ashgate, 2002), pp. 152–200.

⁶⁸ Andrew Shonfield, *British Economic Policy since the War* (Harmondsworth, Middlesex, 1958), esp. p. 14; Jim Tomlinson, '"Inventing decline": the falling behind of the British economy in the postwar years', *Economic History Review*, 49 (1996), 731–57.

lacked the powers necessary to impose its will on the business boardroom or the shop floor.⁶⁹ What the chancellor of the exchequer could do was to set a target for growth, and then adjust the balance between taxation and public expenditure so as to increase domestic demand in the hope that micro-economic reforms agreed by the NEDC would lead to higher output. In the 1962 Budget, Selwyn Lloyd set a target of 4 per cent. In 1964 the Labour government established a new Department of Economic Affairs (DEA) which produced a national plan in 1965 for a 25 per cent increase in GDP between 1964 and 1970. However, the targets set by both the Conservative and Labour governments were beyond what an economy suffering from labour shortages could achieve, especially as any productivity-improving changes resulting from the NEDC's or DEA's consensual deliberations fell far short of what was required to match the increase in demand. The consequences were what one would expect: an inflationary boom, balance-of-payments crises, and deflation from July 1966 in an unsuccessful attempt to avert devaluation. Deflationary measures inevitably included curbing public expenditure, as it would have been politically unacceptable to place the whole burden on the private sector.⁷⁰

There had been sterling crises in 1947, 1949 and 1951–2, and they came with increasing frequency from the mid-1950s: in 1955, 1956, 1957, 1961–2, 1965, 1966 and 1967. Overseas sterling balances made the currency vulnerable to speculation. Between 1954 and 1958, in order to facilitate multilateral trade, exchange controls were relaxed and sterling held by non-UK residents was made readily convertible at the rate fixed in 1949 (\$2.80), so that sterling balances represented short-term liabilities, whereas earlier in the post-war period they had been partially blocked or were inconvertible. In the late 1930s Britain's reserves of gold and foreign exchange had been roughly equal to short-term liabilities, but in the 1950s sterling liabilities exceeded reserves in the ratio of about 4:1. Moreover, whereas the original sterling balances had been held by central banks as reserves, in the 1950s and 1960s overseas sterling holdings were increasingly in the hands of commercial banks or trading companies that would not hesitate to convert them into another currency if there was any indication that sterling might be devalued. A balance-of-payments deficit, putting pressure on Britain's

⁶⁹ Hugh Pemberton, 'Relative decline and British economic policy in the 1960s', *Historical Journal* 47 (2004), 989–1013; Astrid Ringe and Neil Rollings, 'Responding to relative decline: the creation of the National Economic Development Council', *Economic History Review*, 53 (2000), 331–53.

⁷⁰ Sir Alec Cairncross, *Managing the British Economy in the 1960s: A Treasury Perspective* (Basingstoke: Macmillan, 1996).

convertible currency reserves, acted as such a signal.⁷¹ In most years the balance of payments was in surplus, but there were deficits in 1955, 1960–1, 1964–5 and 1967, and there would have been a deficit in 1966 had deflationary action not been taken by the government. The Treasury urged that economic policy should aim at a substantial surplus in the balance of payments on current account to strengthen the reserves, but a booming domestic economy tended to suck in imports and consume products that might otherwise have been exported. The surplus reached the annual target of £300 million set by the Treasury in 1956 only once between then and devaluation in 1967, and the figure of £450 million that the Treasury believed in 1959 would be a desirable annual average was not achieved until 1969.⁷²

The sterling area was, none the less, seen in Whitehall as a source of strength. Ministers were told in June 1956 by an interdepartmental working group of officials, headed by Sir Norman Brook, that sterling was an important Commonwealth link. All the dominions, except Canada, used sterling as a reserve currency, as did the colonies. The Treasury believed that devaluation, following on so closely that of 1949, would break up the sterling area; members would turn to more dependable currencies for their reserves and the effect on the political cohesion of the Commonwealth would be disastrous. Sterling was also used for about 40 to 50 per cent of all world trade, and it was believed that instability in exchange rates would cause confusion. From this perspective, preserving the international value of sterling was, according to Brook's working group, 'the greatest single contribution' Britain could make to the maintenance of her position in world affairs.⁷³ When the Eden government was making military plans in August and September to respond to Colonel Nasser's nationalisation of the Suez Canal Company, Treasury officials warned the Chancellor, Macmillan, that foreign confidence in sterling was weak and that it was vital that Britain should not act in Egypt without the 'maximum United States' support'.⁷⁴ However, Macmillan apparently failed to convey to his Cabinet colleagues the full significance of sterling's weakness. He believed, mistakenly, that the Americans were as keen as the British to bring Nasser down and would do nothing to endanger sterling. Nasser

⁷¹ (Radcliffe) Committee on the Working of the Currency System, *Report* (Cmnd 827), Aug. 1959, PP 1958–59, xvii. p. 389, paras. 613–28, 634–43.

⁷² 'The future of the United Kingdom in world affairs', PR (56) 3, 1 June 1956, para. 17, CAB 134/1315, TNA; Cmnd 827, para. 734; London and Cambridge Economic Service, *The British Economy: Key Statistics 1900–1970* (1971), p. 17.

⁷³ PR (56) 3, 1 June 1956, CAB 134/1315, TNA.

⁷⁴ Bridges to Macmillan, 8 Aug. and 7 Sep. 1956, and T. L. Rowan to Macmillan, 25 Sep. 1956, T 236/4188, TNA.

responded to the Anglo-French invasion on 5 November by blocking the canal with sunken ships; the effect was to reduce the flow of oil from the Middle East, raising prices, and British exports were also expected to suffer. Confidence in sterling fell, leading to a run on Britain's gold and dollar reserves, and the American government was able to hold up support from the International Monetary Fund (IMF) until Britain and France agreed to withdraw their troops. The alternative would have been to allow sterling to depreciate, but the advice of the Bank of England, after consultation with Commonwealth central banks, was that such action so soon after the devaluation in 1949 would probably cause the break up of the sterling area.⁷⁵

When Wilson became prime minister in 1964 he was very conscious of the danger that Labour would come to be regarded as the party of devaluation if he followed the example of the Attlee government. The Chancellor of the Exchequer, James Callaghan, regarded devaluation as unjust to countries which held their reserves in sterling, and made plain that he would resign if devaluation were forced on him. On the other hand, pressure on the exchange rate was almost continuous from 1964 to 1967 and the deflationary measures taken in July 1966 involved not only acceptance of a lower growth rate than that set out in the National Plan but also reductions in expenditure plans for hospitals and local authority housing as well as for defence. The American government, concerned that sterling devaluation would lead to speculation against the dollar, organised international loans to Britain from November 1964, but loans could only buy time. Even after devaluation in November 1967 there was doubt on foreign exchange markets whether the new rate, \$2.40, could be maintained. A standby credit from the IMF was required to deal with speculation, and the IMF required a letter of intent regarding cuts in public expenditure. Moreover, as usual, devaluation raised the price of imports more quickly than the volume of exports. Continued deflationary measures were required in 1968 and 1969 to curb public expenditure and domestic demand so as to release resources to produce exports.⁷⁶

Why was defence expenditure a prominent target for economies from the mid-1950s? The most obvious reason was that military personnel had to be maintained abroad and were a direct charge on the United Kingdom balance of payments. As table 6.4 shows, there was a marked reduction in the numbers of personnel overseas between 1955 and the

⁷⁵ Diane B. Kunz, *The Economic Diplomacy of the Suez Crisis* (Chapel Hill: University of North Carolina Press, 1991), pp. 128–52.

⁷⁶ Cairncross, *Managing the British Economy*, pp. 195–8, 202–4, 211–12, 230–1.

Table 6.4. *Defence personnel overseas and balance-of-payments cost, 1955, 1961 and 1967*

	<i>Defence personnel ('000)</i>			<i>Balance-of-payments cost (£m.)</i>		
	1955	1961	1967	1955	1961	1967
Total overseas	372	206	200	152	225	281
Europe	108	67	64	30	—	89
Elsewhere	265	139	136	122	—	192

Source: Richard N. Cooper, 'The balance of payments', in Richard E. Caves and associates, *Britain's Economic Prospects* (Washington: The Brookings Institution, 1968), p. 169.

1960s, but the cost rose. The increase partly reflected the higher standards of living required for long-service volunteers with wives and children, following the ending of conscription, and partly the fact that after the evacuation of the Suez base, new bases were built in Cyprus, Kenya and Aden. However, defence imposed a much smaller burden on the balance of payments than gross figures suggested. For example, the cost of maintaining the British troops in Germany was offset by arrangements whereby each year the West German government would purchase supplies in Britain, the total agreed in 1967 being £70 million. Likewise, Britain earned £40 million a year from dollars spent by American forces stationed in Britain. Moreover, it was calculated in Whitehall in 1967 that if all the British forces overseas were to be brought home and demobilised, they would still spend about £26 million in foreign exchange since, like civilians resident in Britain, they would spend part of their incomes on imports. Even if the £120 million that Britain currently earned by exporting arms were not included as an offset, the real burden of defence on the balance of payments was only about half of what it appeared to be.⁷⁷ Cutting overseas expenditure would help, but the key to the balance-of-payments problem was to increase the proportion of national output devoted to producing marketable goods for export or as substitutes for imports.

As table 6.5 shows, Britain devoted a higher proportion of her national income to defence than any other European country, except France at the height of the Algerian war. It was not difficult to establish in the minds of ministers a correlation between a relatively high level of defence expenditure, on the one hand, and a falling share of world exports of manufactures, a lower growth rate than other Western

⁷⁷ Ministry of Defence, 'Notes on the government achievement in cutting defence expenditure', 21 June 1967, PREM 13/1385, TNA.

Table 6.5. *Defence expenditure of leading NATO countries as percentage of GNP at factor cost, 1954-69*

	France	UK	West Germany	Total Europe	USA
1954	8.5	9.9	4.7	7.1	12.7
1955	7.4	9.2	4.8	6.5	11.0
1956	8.8	8.8	4.2	6.6	10.7
1957	8.4	8.0	4.7	6.3	10.9
1958	7.8	7.8	3.4	5.7	10.9
1959	7.7	7.4	5.0	5.9	10.3
1960	7.4	7.3	4.6	5.7	9.9
1961	7.3	7.0	4.6	5.6	10.0
1962	7.1	8.0	5.5	6.0	10.2
1963	6.5	6.9	6.0	5.7	9.7
1964	6.3	6.8	5.4	5.5	8.9
1965	6.1	6.6	5.0	5.3	8.3
1966	5.9	6.5	4.7	5.1	9.2
1967	5.9	6.5	5.0	5.2	10.3
1968	5.5	6.2	4.1	4.8	10.2
1969	4.9	5.8	4.1	4.5	9.6

Source: NATO Information Service, *NATO Facts and Figures* (Brussels, 1976), pp. 294-5.

European countries, and the weakness of sterling on the other. Eden thought that Britain was trying to do more things in the field of defence than resources would allow without economic strains and shortcomings in the forces themselves. After the General Election of 1955 he decided that economies must be made, and the hydrogen bomb offered the opportunity to do so without a loss of striking power.⁷⁸ At his prompting, the new Minister of Defence, Selwyn Lloyd, asked in May for forecasts of planned expenditure over the next seven years, although at the time the normal planning period was three years. The forecasts showed that, if nothing was cut from the defence department's programmes, expenditure would rise from £1,527 million in 1955/6 to £1,939 million in 1959/60, before falling to £1,860 million in 1962/3. Lloyd told the Chiefs of Staff that the figures were too high and asked them to assume that the basic annual figure would be £1,580 million. They returned in October with figures of £1,610 million for 1956/7, £1,595 million for 1957/8 and Lloyd's figure of £1,580 million for 1958/9. By the time that the programme was being discussed in the Defence Committee in the following month, however, Lloyd had to

⁷⁸ Anthony Eden, *The Memoirs of Sir Anthony Eden: Full Circle* (London: Cassell, 1960), pp. 368-70.

Table 6.6. *Strength of armed forces and women's services, 1954-69 ('000)*

	Total	RN	Army	RAF
1954	839	133	445	258
1957	702	114	367	220
1960	519	97	258	164
1963	426	96	188	142
1966	417	98	193	125
1969	380	88	177	113

Note: Owing to rounding, the combined numbers for the individual services do not always equal the total in column 1.

Source: Central Statistical Office, *Annual Abstract of Statistics*

admit that the latest estimate for the cost of research and development in 1958/9 was £20 million higher on account of measures taken to speed up the introduction of new weapons. The Chancellor of the Exchequer, Butler, said that at a time when there was a need to free more resources for exports (there was an ongoing sterling crisis) it would be wrong to adopt a programme that would result in government demand taking a higher share of GNP.⁷⁹ Eden agreed, and led the Defence Committee in a review of the programmes that, as already noted, resulted in him thinking in terms of economising on fighters for the RAF (see p. 284).

Eden wanted to abolish conscription to ease industry's labour shortage.⁸⁰ In the event, he resigned before the new shape of the forces was finalised and it fell to Macmillan to take the final decision. The 1957 Defence White Paper pointed out that 7 per cent of the working population was either in the defence services or supporting them; 12.5 per cent of the output of the metal-using industries, on which export trade largely depended, was devoted to defence orders; and a high proportion of scientists and engineers were engaged in military work although there was a shortage of scientists and technicians in civil industry.⁸¹ The ending of conscription resulted in the transfer of hundreds of thousands of servicemen into civil employment, chiefly at the expense of the army (see table 6.6).

The arguments in the 1957 White Paper resurfaced in more technocratic prose in Labour's National Plan of September 1965. Defence

⁷⁹ 'UK defence programme: memorandum by the Minister of Defence', DC (55) 43, 14 Oct., and Defence Committee minutes, 4 Nov. 1955, CAB 131/16, TNA.

⁸⁰ Eden, *Full Circle*, p. 373.

⁸¹ Cmnd 124, paras. 7, 58.

Table 6.7. *Defence expenditure as a percentage of GDP, 1954/5 to 1969/70*

Financial year	
1954/5	9.0
1955/6	8.2
1956/7	8.3
1957/8	7.4
1958/9	7.3
1959/60	6.9
1960/1	6.9
1961/2	6.9
1962/3	6.8
1963/4	6.5
1964/5	6.4
1965/6	6.4
1966/7	6.2
1967/8	6.3
1968/9	5.8
1969/70	5.3

Sources: Central Statistical Office, *Annual Abstract of Statistics*; Mitchell, *British Historical Statistics*, p. 830.

pre-empted 'a large part of the productive potential of some of the most important and technologically advanced industrial resources' and used 5 per cent of the labour force. Defence was taking up more resources than Britain's total investment in industrial plant and machinery did, and between a third and two-fifths of research and development was defence-related.⁸² The recasting of defence policy was not simply a matter of reducing the strain on the balance of payments but was also intended to be part of a major effort to modernise Britain.

A comparison of table 6.7 with the comparable figures in tables 1.1, 3.2 and 5.3 shows that in the post-war period defence took up a higher proportion of GDP down to 1968/9 than had been the case in the ten years before the First World War or in the years 1920/1 to 1936/7 inclusive. Moreover, whereas the rise in defence expenditure in the late 1930s had been at a time of high unemployment, the competition between civil and military use of labour and capital was much greater in conditions of full employment after the Second World War. In these circumstances economic analysis suggests that defence expenditure contributed to Britain's slower economic growth compared with countries that devoted less of GDP to defence. A study of fourteen advanced

⁸² *The National Plan* (Cmnd 2764), PP 1964–65, xxx. 1, ch. 19, para. 3.

Table 6.8. *Index of defence expenditure at constant prices, 1955–69 (1960=100)*

1955	108.2
1956	105.5
1957	99.4
1958	97.2
1959	97.0
1960	100.0
1961	99.9
1962	100.9
1963	102.8
1964	106.5
1965	106.2
1966	105.2
1967	108.5
1968	106.2
1969	99.5

Source: Greenwood, 'Defence and national priorities since 1945', p. 191.

Western countries for the years 1954 to 1973 showed that reduced investment was a major opportunity cost of defence expenditure.⁸³ While there is no simple correlation between investment and economic growth, since the return on investment varies, up-to-date plant and transport are necessary conditions of progress.

Although defence expenditure fell as a proportion of national income after 1952/3, national income was rising, and consequently a lower proportion of national income did not necessarily imply a lower level of expenditure. Greenwood used statistics compiled by the Stockholm International Peace Research Institute to show that British defence expenditure was much more stable than the figures in tables 6.5 and 6.7 suggest (see table 6.8). The Stockholm Institute calculated defence expenditure at 1970 prices, and table 6.8 shows by how much defence expenditure varied at constant prices compared with 1960. Eden and Macmillan (down to 1959) come out as the most successful economisers. After 1961, rapidly rising development costs for TSR-2 and other advanced weapons systems led to higher defence expenditure in real terms down to 1964, and although Labour's defence review on taking office temporarily reversed the trend, there was a further upward surge in 1967, the year of devaluation. In real terms, defence expenditure was maintained

⁸³ Ronald P. Smith, 'Military expenditure and investment in OECD countries 1954–73', *Journal of Comparative Economics*, 4 (1980), 19–32.

at or above the 1960 level, but rising costs of new weapons systems made it necessary to reshape the defence forces to keep within budget.

The economy: the defence industries

Rising costs of research and development also had implications for the shape of the defence industries. The Cabinet's Economic Policy Committee had been assured in 1952 by the Ministry of Supply that Britain had a remarkable technical lead over competitors in aircraft manufacture and that there was enormous potential for the industry.⁸⁴ The industry was the third largest in the world and was highly concentrated. In 1955, the top six firms: Vickers-Armstrong, Hawker Siddeley, Rolls-Royce, Bristol, English Electric and de Havilland, accounted for 80–90 per cent of output. On the other hand, some of these firms maintained more than one design team. Smaller firms, like Boulton Paul and Saunders-Roe, were kept going with research contracts. The industry benefited from considerable expenditure by the Ministry of Supply on research and development, which almost matched what firms spent themselves, but the money was spread round too many projects.⁸⁵ The trouble was that Britain was trying to carry out fundamental research on such things as delta wings and at the same time produce the whole range of military and civil aircraft required for the RAF, the FAA and the nationalised airlines, BEA and BOAC. Yet, as the 1961 Defence White Paper pointed out, the United States and the Soviet Union each spent on research and development alone larger sums than the entire British defence budget.⁸⁶ The consequences were lengthy delays in development of aircraft and guided missiles. The navy's Sea Slug SAM first flew in 1950 but did not complete its development trials until 1961. In 1960 the Public Accounts Committee strongly criticised the Sea Slug programme, noting that it was costing more than twice earlier estimates and commenting that delays in its entry into service were 'inexcusable'.⁸⁷

By January 1956 the Secretary of State for Air, Birch, believed that amalgamations of firms were needed to prevent growing competition for a limited number of skilled technicians. The Minister of Supply, Reginald Maudling, disagreed, on the grounds that amalgamating firms would not increase the number of technicians. He was at one with Birch

⁸⁴ Economic Policy Committee minutes, 29 May 1952, CAB 134/842, TNA.

⁸⁵ Edgerton, *England and the Aeroplane*, pp. 90–2, 96.

⁸⁶ *Report on Defence* (Cmnd 1288), PP 1960–61, xxiv. 463, para. 29.

⁸⁷ Eric Grove, 'The Royal Navy and the guided missile', in Harding (ed.), *Royal Navy 1930–2000*, pp. 193–212, at pp. 195–9.

on the need for a greater concentration of effort, but argued that the remedy lay in reducing the number of projects, as it was in the development phase, not during production, that delays occurred. A number of projects were dropped and Eden asked the Minister of Defence, Sir Walter Monckton, to undertake an internal inquiry into the supply of military aircraft.⁸⁸ In September the steering committee of officials appointed by Monckton from the ministries of Air, Defence and Supply had produced a first report that identified a number of problems, mainly in procurement procedures. It was noted that a major project now took something like ten years from inception to completion, but planning of the research and development programme was virtually on a year-to-year basis. The officials recommended that the programme should be on the basis of a ten-year forecast of requirements and resources. It was recognised that changes in defence policy or strategy would continue to lead to cancellation of some projects, but it would be impossible to complete projects on time unless the total programme was related to the supply of scientists and engineers. The shortage of skilled technicians was acute and could not be expected to disappear for many years to come. The major problem in the relationship between the government and the industry was reported to be inadequate competition between firms. Whereas in the United States there was real competition because there were sufficient resources for more than one type of aircraft or guided missile to be developed for a given role, in Britain resources were so limited that normally competition did not extend beyond the design study stage.⁸⁹ The idea of inviting foreign firms to tender for contracts for British requirements does not seem to have occurred to the officials.

The 1957 Defence White Paper made clear that there would be fewer research and development projects and production orders for military aircraft in future. In July 1957 a 'background' paper was circulated to the Cabinet listing a number of well-known aircraft firms where workers were likely to be made redundant as a result. It was expected that over the next four or five years the numbers employed in the manufacture of airframes, aero-engines and related equipment, excluding electrical equipment, would fall by about 100,000 to about 150,000, or what had been the level before the Korean War.⁹⁰ The programmes for guided

⁸⁸ 'Aircraft programme', Gen 514/1st meeting, 23 Jan. 1956, Gen 514/2nd meeting, 31 May 1956, PREM 11/1712, TNA.

⁸⁹ 'First report to ministers by Steering Committee on Aircraft Supply', 20 Sep. 1956, DEFE 7/1128, TNA.

⁹⁰ 'Defence programme', memorandum by the Minister of Supply, 28 June 1957, C (57) 155, CAB 129/88; Brook to Prime Minister 'Defence programme', 8 July 1957, PREM 11/1773, TNA.

weapon development were not expected to absorb much of the redundant labour: in 1957 about 2,000 people were employed upon such work and the total was not expected to rise above about 10,000.⁹¹ Macmillan had wanted to set up a Cabinet committee on the future of the aircraft industry, but he was advised by Brook in May 1957 that a detailed inquiry would have to deal with the efficiency of the industry and would require more time than ministers could give. On the other hand, an outside inquiry was likely to undermine public confidence, and Brook suggested that the work be given to officials. 'We should need to mask the fact that the enquiry was concerned with efficiency', he added. This could be done by framing their terms of reference along the lines of: 'the effects of the new defence policy on the future of the aircraft industry'. Some ministers, nevertheless, wanted an outside inquiry, and the Chancellor of the Exchequer, Thorneycroft, was asked to consider what the scope and nature of the inquiry should be. Thorneycroft took the view that an outside inquiry might lead to some embarrassing disclosures about the poor return for the large sums of public money spent in the civil as well as the military fields, and the outcome was a working party of senior officials from the Air Ministry, the Board of Trade, the Ministry of Supply, the Ministry of Transport and Civil Aviation, and the Treasury, with a Treasury chairman, Sir Thomas Padmore.⁹² The working party reported in April 1958 in favour of continuing government support for research and development for both military and civil aircraft, on condition that the industry reorganised itself to meet the changed conditions with which it was now faced.⁹³

Meanwhile the Permanent Secretary of the Ministry of Supply, Sir Cyril Musgrave, had told the heads of the major aircraft manufacturers at a meeting in September 1957 that only one major military project had survived the Sandys White Paper, a multi-purpose aircraft to replace the Canberra (the future TSR-2), and that the design contract would not be placed with any one firm, but with a consortium. He advised them that there was unlikely to be a need for more than three airframe firms for military requirements in future and that the government hoped that the industry would rationalise itself through amalgamations. Sandys, who became minister of aviation in October 1959, aimed at two airframe groups and two aero-engine groups. The outcome of much wheeling

⁹¹ Aircraft Industry Working Party, AI (WP) 1st meeting, 20 Sep. 1957, DEFE 7/1128, TNA.

⁹² Brook to Prime Minister, 14 May 1957, and Thorneycroft to Prime Minister, 31 July 1957, PREM 11/2214, TNA.

⁹³ 'Future of the aircraft industry: aeronautical research and development', EA (58) 32, 24 Apr. 1958, CAB 134/1679, TNA.

and dealing was that by the early 1960s most of the thirteen firms that had produced military aircraft in the 1950s had been absorbed into Hawker Siddeley or a new firm, British Aircraft Corporation (BAC), and all helicopter work had been put into Westland Aircraft. Westland had come to dominate the British helicopter market by acquiring in-house expertise through licensed production of American Sikorsky designs, which had proved to be superior to government-sponsored indigenous projects. Aero-engine work was concentrated in two firms: Bristol Siddeley and Rolls-Royce.⁹⁴ Employment in the industry had not fallen since 1957. In 1965 Hawker Siddeley employed 123,000 workers, making it the second largest manufacturing firm in the United Kingdom, and BAC employed 42,000. After Rolls-Royce took over Bristol Siddeley in 1966 it employed 88,000 workers. In comparison, total employment in the French aircraft industry was 85,000.⁹⁵

The Labour government also undertook a major inquiry into the aircraft industry by a committee chaired by Lord Plowden, who had been chief executive of the Ministry of Aircraft Production during the war. Plowden reported in 1965 that a reduction in the size of the industry was desirable as it received far more government support than any other, and he recommended collaboration with European countries in order to be able to compete with American firms.⁹⁶ An American study in 1968 noted that the British aircraft industry was characterised by lower labour productivity and higher costs than in the United States, but doubted whether collaborative projects would reduce overall costs, citing the already expensive Concorde project as evidence. A better alternative might be for a slimmed-down, cost-conscious British industry to concentrate on a limited range of projects which had been chosen on economic grounds, including export prospects. Some types would have to be imported but the fact that the option of domestic production existed would strengthen the hand of British negotiators dealing with foreign firms.⁹⁷

The decision to terminate the development of fighter projects in 1957 was bitterly resented in the aircraft industry. Hawker Siddeley was able to secure official support for a revolutionary, if subsonic, VTOL

⁹⁴ Charles Gardner, *British Aircraft Corporation* (London: B. T. Batsford 1981), pp. 17–19, 23–8; Matthew Uttley, *Westland and the British Helicopter Industry, 1945–1960* (London: Frank Cass, 2001).

⁹⁵ Edgerton, *England and the Aeroplane*, pp. 96–7; R. de Narbonne, 'French challenge', *Royal Air Force Flying Review*, 18 (May 1963), 15.

⁹⁶ *Report of a Committee into the Aircraft Industry* (Cmnd 2853), PP 1965–66, iv. 189, paras. 205, 208, 458 and 523.

⁹⁷ Merton J. Peck, 'Science and technology', in Richard E. Caves and associates, *Britain's Economic Prospects* (Washington: Brookings Institution, 1968), pp. 448–84, at pp. 471–6.

ground-attack fighter, the P.1127, which first flew in 1960. The P.1127 was very nearly a victim of Labour's defence review in 1966: the Secretary of State for Defence, Healey, wished to cancel it, both on financial grounds and because he was doubtful about how often its VTOL characteristics would be required. The Cabinet Secretary, Trend, advised Wilson in January that there was no alternative to cancellation in favour of a projected conventional Anglo-French tactical support fighter, the Jaguar, if the review was to reach its financial target, but that a decision to contract out of technological advance would require 'very careful presentation'. Neither the RAF nor the Admiralty was willing to make sacrifices to accommodate the P.1127 in their equipment programmes, perhaps because of its cost, which, at constant prices, was two-and-a-half times that of the P.1 Lightning interceptor, which had entered service in 1961, and more than eight times that of the Hunter fighter-bomber, which the P.1127 was intended to replace. Nevertheless, the Ministry of Aviation fought hard throughout 1966, arguing that cancellation when Britain held a world lead in VTOL technology would destroy the aircraft industry's confidence in the government. Even the Treasury began to waver in its opposition to the project when it realised that American aircraft would have to be ordered to fill the gap before the Jaguar would be available, increasing dollar expenditure at a time when sterling was under pressure. The possibility of export earnings to offset development costs was also placed in the balance against cancellation, justifiably so since the P.1127 was later adopted by the US Marine Corps.⁹⁸ In the event, the P.1127 was placed in production as the Harrier and began to replace the Hunter in the RAF from 1968 and entered service with the FAA in 1979, serving with distinction in the Falklands War in 1982. The success of the Harrier contrasted with the failure of contemporary French and German VTOL projects, the Dassault Mirage IIIV and the Entwicklungsring Süd VJ 101 X1, to reach production status. Despite all that had happened between 1957 and 1965 the British aerospace industry was still the third largest in the world in terms of capacity for undertaking research and development, and was able to take a leading role in collaborative projects with European partners in line with government policy.⁹⁹

⁹⁸ Trend to Prime Minister, 'Defence review', 18 Jan. 1966, PREM 13/800; Defence and Overseas Policy Committee minutes, 21 Jan., 22 Jan., 13 Feb. and 19 Dec. 1966, CAB 148/25; Cabinet conclusions, 22 Dec. 1966, CAB 128/41, TNA. Figures for costs of aircraft from Keith Hayward, *The British Aircraft Industry* (Manchester University Press, 1989), p. 6.

⁹⁹ Humphrey Wynn, 'Intra-European collaboration', *Royal Air Force Flying Review*, 20 (June 1965), 13–20.

Warship builders suffered from a decline in naval orders, and the problems of the shipbuilding industry were compounded by competition from West Germany, Japan, the Netherlands and Sweden in export markets for merchant ships. Credit arrangements or subsidies in these countries encouraged investment in more modern techniques, but the Cabinet's Economic Policy Committee took the view in 1959 that subsidies would serve no purpose in Britain until management and trade unions could agree to measures to improve industrial relations and reduce costs in line with competitors.¹⁰⁰ By the 1960s there was surplus shipbuilding capacity in the world, and a contraction in the British industry was inevitable. The Geddes Report noted in 1966 that research and development had been neglected, industrial relations were still poor and there were too many yards chasing too few customers.¹⁰¹ Fairfield, the firm that had built the last British cruiser, HMS *Blake*, ran out of funds in 1965 and the government took a 50 per cent stake in the company, Upper Clyde Shipbuilders (UCS), which absorbed Fairfield and most of the other warship builders on the Clyde. UCS did not prosper and was the scene of a famous work-in in 1970. Rationalisation also took place on the Tyne. Even so, the Royal Navy – still the third largest in the world – placed all its orders with British firms, ensuring that Britain's capacity to build warships was exceeded only by the United States and the Soviet Union.

The army's suppliers also suffered from a contraction of orders, but the Chieftain tank programme kept production lines going at Vickers' plant at Elswick and the royal ordnance factory at Leeds. Both of these concerns, plus Alvis, retained the capacity to design armoured fighting vehicles, despite the small size of the British army compared with armies of countries of similar populations. Vickers wisely diversified in the 1950s, but in the 1960s it was still a major producer of armaments.¹⁰² Given that defence expenditure at constant prices in 1969 was higher than in 1959 (see table 6.8), it is not surprising that the military-industrial complex was still large. However, the increasing cost of weapons systems, especially research and development, meant that fewer projects could be afforded and the defence industries had to be slimmed down in much the same way as the defence services themselves were.

¹⁰⁰ Economic Policy Committee minutes, 4 Feb. and 8 July 1959, CAB 134/1681, TNA.

¹⁰¹ *Shipbuilding Inquiry Committee 1965–66 Report* (Cmnd 2937), PP 1965–66, vii. 45.

¹⁰² J. D. Scott, *Vickers: A History* (London: Weidenfeld and Nicolson, 1962), pp. 361–4, 368–71.

Global strategy: the impact of the hydrogen bomb

Since the United States was by far the senior partner in the Anglo-American 'special relationship', the context for the impact of technical change on strategy is best provided by looking at American strategic thought, as represented by Bernard Brodie. Brodie's *Strategy in the Missile Age* (1959) did not, as he modestly noted, cause the changes that occurred in American strategy after 1960, but it did set out the intellectual framework within which the movement from the doctrines of the Eisenhower era to those of the Kennedy era took place.¹⁰³ After the Korean War had ended, Congress was unlikely to continue to vote increased funds for military expenditure, and the destructive power of atomic weapons seemed to provide a cost-effective means of countering Soviet superiority in conventional forces. In a speech on 12 January 1954 the Secretary of State, John Foster Dulles described American strategic doctrine as one of 'massive retaliation'. Instead of *ad hoc* responses with conventional forces to Communist aggression, as in Korea, the National Security Council had decided to rely primarily upon 'a great capacity to retaliate, instantly, by means and at places of our own choosing'. Where, on a sliding scale of possible examples of aggression, the massive retaliation principle would be applied was not specified, apparently in a deliberate attempt to keep Communist leaders guessing. In December 1954 ministers on the North Atlantic Council authorised NATO planners to proceed on the basis that thermonuclear weapons would be used from the outset of a war, even in the unlikely event of the Soviet forces refraining from using atomic weapons. On the other hand, by October 1957 – the month when the first Soviet space satellite was launched – Dulles was retreating from the doctrine of massive retaliation by referring publicly to the development of tactical nuclear weapons as an alternative.¹⁰⁴

¹⁰³ Preface to paperback edition (Princeton University Press, 1965), p. v.

¹⁰⁴ Bernard Brodie, *Strategy in the Missile Age* (Princeton University Press, 1959), pp. 229, 248–54, 261–2. For the origins of the doctrine of massive retaliation, and its implementation, see John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy* (New York: Oxford University Press, 1982), pp. 146–52, 165–75. For NATO doctrine, see 'The most effective pattern of NATO military strength for the next few years', report by the Military Committee to the North Atlantic Council, 18 Nov. 1954, MC 48, paras. 3–4, 6–7, reproduced in *NATO Strategy Documents 1949–1969*, ed. Gregory W. Pedlow (NATO Graphics Studio, 1997), pp. 231–50. For the debate on the balance between massive retaliation and the use of conventional forces, see Stephen Twigge and Alan Macmillan, 'Britain, the United States, and the development of NATO strategy, 1950–1964', *Journal of Strategic Studies*, 19 (1996), no. 2, 260–81.

As Brodie pointed out, the hydrogen bomb was different from earlier weapons, even the atomic bomb, in that a small number would be more than sufficient to disable any enemy, including a superpower. The number of American or Soviet cities or industrial centres whose destruction would end either an economy's ability, or society's will, to conduct a war was not more than 200, and possibly as small as 50, depending upon assumptions about the interdependence of industries. The advantage would lie with whichever power took the initiative because, even with radar early warning systems, fighter defences could not bring down enough bombers to prevent mass destruction, and ICBMs would be invulnerable to interception for the foreseeable future. On the other hand, there were ways in which an ability to retaliate – so-called second-strike capability – could be preserved. A country's strategic aircraft could be dispersed and concealed on the ground; a proportion kept in the air at all times (as USAF heavy bombers, with their large crews, unlike British medium bombers, were able to do); and a high proportion of the remaining aircraft kept prepared to take off as soon as an attack threatened. Missiles could be protected in hardened silos (as American ICBMs were in the 1960s), or launched from widely dispersed submarines (as with Polaris). Once each side had sufficient second-strike capability neither could resort to the all-out use of thermonuclear forces, either in a pre-emptive strike or in retaliation to aggression, except as a suicidal act.

Brodie put forward the concept of a 'limited war', limited in the sense that each side tacitly agreed to refrain from bombing cities, which, in a thermonuclear context, would mean no strategic bombing between the United States and the Soviet Union. Likewise, tactical nuclear weapons might be used in sparsely populated areas only. Such a war must also be limited in its objectives, to leave room for negotiation to bring it to an end. Even so, the risks of escalation would be high, and some situations would not be considered to be serious enough for nuclear weapons, however limited their use. Brodie, therefore, argued for the United States having a substantial capability for fighting limited wars on a non-nuclear basis. He was critical of the British Defence White Paper of 1958 for its 'all-or-nothing' approach to the use of nuclear weapons in the defence of Western Europe, as it left no room for political or military manoeuvre.

NATO strategy, as set out by the alliance's Military Committee in February 1957, provided for readiness to deal with 'infiltrations, incursions or hostile local actions' in the NATO area 'without necessarily having recourse to nuclear weapons', but stated bluntly that 'in no

case is there a NATO concept of limited war with the Soviets'.¹⁰⁵ However, in the following year, the SACEUR, General Lauris Norstad, told the Senate Committee on Foreign Relations that one of the functions of NATO's proposed 'shield' of thirty combat-ready divisions in Western Europe was to delay Soviet land forces long enough to give some flexibility by removing the need to choose at once between total war or acquiescence in some act of aggression. Behind the 'shield' was the 'sword' of US Strategic Air Command and the RAF's Bomber Command. Norstad's statement anticipated the doctrine of flexible response, which became official American strategy in 1961. Massive retaliation remained at one end of a spectrum that stretched to wholly conventional forces at the other. The Kennedy administration felt less need to economise on defence than the Eisenhower administration had done, and a reassessment of Warsaw Pact forces suggested that the problem of defending Western Europe without using nuclear weapons was less hopeless than previously believed. Crises could be dealt with by conventional forces in the first instance, as in 1961, when the American response to the building of the Berlin Wall was to mobilise additional army divisions, or in 1962, when the presence of American conventional forces in the Caribbean left Khrushchev with no option but to withdraw Soviet missiles from Cuba or risk nuclear war. Flexible response required co-ordinated command; hence the offer to equip a NATO multilateral nuclear force of surface ships armed with Polaris missiles, under the command of the SACEUR, as an alternative to a proliferation of small national nuclear forces (an offer that was dropped in 1966 when it became clear that it was of interest only to the West Germans).

When the British Chiefs of Staff Committee first considered the impact of the hydrogen bomb on global strategy in 1954 they agreed that American nuclear superiority over the Soviet Union made a deliberate act of war unlikely until the latter had caught up three or four years hence. Even thereafter, mutual deterrence was probable, provided NATO allies maintained their unity and continued to build up their military strength. Communist subversion, backed by the supply of arms and financial aid, as opposed to overt attack or invasion, was the immediate threat.¹⁰⁶ The hydrogen bomb therefore by no means disposed of the need to maintain conventional forces to deal with 'limited war'. Moreover, in August 1954, after the French

¹⁰⁵ 'Overall strategic concept for the defense of the North Atlantic Treaty Organisation area', 21 Feb. 1957, MC 14/2 (Revised), para. 19, reprinted in *NATO Strategy Documents*, pp. 279–313.

¹⁰⁶ 'United Kingdom defence policy', C (54) 249, 23 July 1954, CAB 129/69, and later version D (54) 43, 23 Dec. 1954, CAB 131/14, TNA.

National Assembly had rejected the proposal to incorporate West German troops into a multinational European Defence Community, it was clear that West Germany could be brought into NATO only if some other way could be found to pacify fears of *les Boches*. Eden, as foreign secretary, achieved this in the Paris Agreements in October, when he committed Britain to maintaining four divisions, plus a tactical air force, for the defence of Western Europe, in return for France's agreement to West Germany joining NATO via the Western European Union (WEU).¹⁰⁷

The main thrust of the Swinton Committee's report in November 1954 was its support for the RAF's case for a nuclear deterrent of 240 V-bombers. It was argued that 'the very survival' of Britain in war would depend upon the prompt elimination of Soviet air bases, and that that task could not be left to the US Strategic Air Command as there could be no assurance about American priorities as regards targets.¹⁰⁸ This argument was publicly stated by Churchill on 1 March 1955 in the debate on the 1955 Defence White Paper, which announced the decision to develop the hydrogen bomb.¹⁰⁹ Yet the priority for the nuclear deterrent was not absolute: the White Paper also stated that Britain must play its part in defending the interests of the 'free world as a whole, and particularly the Commonwealth and Empire', in the Cold War, for which role the army and navy were required.¹¹⁰

By 1955 the nature of thermonuclear weapons, and their implications for global strategy, could be discussed by ministers in the light of the Strath Report (see pp. 281–2). Eden believed that one consequence of the hydrogen bomb would be a reduction in the advantage of physically larger countries, since all would become equally vulnerable. While the Soviet Union could be expected to match the West in the development of nuclear weapons, he also believed that the bomb would deter superior conventional forces in Europe.¹¹¹ On becoming prime minister he asked the new Minister of Defence, Selwyn Lloyd, to undertake a long-term review of defence programmes over the next five to seven years, with a view to bringing the total cost within a sum set by the Treasury (see p. 306). Lloyd told the services at a meeting on 12 July that a major recasting of the defence programme was required. He proposed that the highest priority be given to the nuclear deterrent, comprising the V-bomber force and its weapons; the Blue Streak IRBM; and 'such

¹⁰⁷ Eden, *Full Circle*, pp. 146–74.

¹⁰⁸ 'Defence policy', C (54) 329, 3 Nov. 1954, CAB 129/71, TNA.

¹⁰⁹ 537 HC Deb., 5s, 1954–55, c. 1897.

¹¹⁰ *Statement on Defence* (Cmd 9391), PP 1954–55, x. 475–504, para. 1.

¹¹¹ Eden, *Full Circle*, pp. 368–9.

nuclear potential as the navy possessed'. The second priority, in his view, should be measures to deal with the Cold War and overseas commitments, plus the air defence of the United Kingdom and 'the minimum civil defence programme required to sustain public morale'. The lowest priority should be given to preparation for a major war. He believed that big economies might be found at the expense of the navy, the Territorial Army and civil defence.¹¹² He followed up with a document known as the 'August Directive' in which he called for an examination of the fleet with a view to deciding which ships were required for Cold War and limited war roles. The navy's contribution to a major war should be restricted to what could be done with these ships and the reserve fleet should be drastically reduced. It should be accepted that at present the navy could not make a contribution to the nuclear deterrent, although he did not rule out a contribution at a later stage.¹¹³ The Admiralty had no intention of accepting Lloyd's strategic vision and pointed out that his proposed financial and manpower ceilings could be met only by abandoning Britain's role as a world-wide naval power, with all that that would entail in loss of influence. A compromise was reached on a figure that Lloyd thought was the minimum necessary for a navy that could fulfil Cold War and limited war roles in the 1960s, 'though not necessarily global war ones'.¹¹⁴

Notwithstanding the government's commitment to give priority to the nuclear deterrent, Lloyd's long-term defence review led in November 1955 to a reduction in the target strength of the V-bomber force for 1959 from 240 to 200. The Chief Scientist at the Ministry of Defence, Brundrett, who some believed was influenced by his earlier service at the Admiralty, argued that a force of 180 would be a sufficiently impressive deterrent to influence the Americans, and that a bigger British contribution to the West's deterrent was unnecessary. On the other hand, he said, the navy and the army had to be able to meet Britain's Cold War and limited war commitments independently of the Americans. The CAS warned that a reduction even to 200 V-bombers would significantly reduce the RAF's ability to destroy targets that threatened Britain's survival in a nuclear war, an ability that the Swinton Committee had considered to be a crucial justification for the force's existence. Once the CAS's 'absolute minimum' figure of 240 had been given up, it was harder for the RAF to resist calls from the Minister of Defence or the Treasury

¹¹² Long Term Defence Programme, minutes of meeting on 12 July 1955, MISC/M (55) 69, DEFE 7/963, TNA.

¹¹³ 'The long term defence programme', memorandum by the Minister of Defence, 17 Aug. 1955, DEFE 7/964.

¹¹⁴ Navias, *Nuclear Weapons*, pp. 75–7.

for further reductions. The purpose of the V-bombers had become essentially political, since the force was not big enough to prevent the United Kingdom from being devastated by a Soviet thermonuclear attack. When there was a need for further economies, the V-bomber force could be subjected to cuts like any other part of the defence programmes: in August 1956 the decision was taken to reduce its target strength to 184, and a year later the target was reduced to 144.¹¹⁵

Given that the services were fighting a major bureaucratic battle during the long-term defence review, it is not surprising that the Chiefs of Staff had difficulty in reaching agreement on what kind of war Britain was supposed to be planning for. In June 1955 they set out three different scenarios, the only common feature of which was a continued need to have all three services prepared for global war. The first scenario envisaged three phases: first, a thermonuclear exchange lasting for three or four days would lead to massive destruction and a breakdown of central command; second, surviving forces across the world would fight with whatever weapons that they had available; third, central control would be re-established over a period of months or even years, with the navy playing a central role. The second scenario began with a local conflict leading to limited war, which escalated via tactical atomic weapons to a full-scale world war in which thermonuclear weapons were used. The third scenario was a variant on the first, with the Soviet navy trying to cut Western Europe off from North America after an initial thermonuclear exchange.¹¹⁶ Clearly the concept of broken-backed warfare had survived the impact of the hydrogen-bomb tests over a year earlier.

Nevertheless, the implications of the use of thermonuclear weapons against the United Kingdom in a future global war did lead to the abandonment of any idea of a long-war strategy such as had informed earlier defence planning. The services' Joint War Production Committee recommended in September 1955 that all planning of expansion of defence production, including conversion of civil industry, for a global war should be abandoned. Industrial capacity devoted to defence production should be limited to what was required for the maintenance and re-equipment of the forces in peace and to enable them to fight a limited war, and 'to provide some insurance against the initial stages of global war'.¹¹⁷ The last requirement gave some protection to the defence

¹¹⁵ Ball, *Bomber in British Strategy*, pp. 126–8, 132, 146–7; Baylis *Ambiguity and Deterrence*, pp. 224–6, 248.

¹¹⁶ Confidential annex to COS (55) 51st meeting, 29 June 1955, DEFE 7/963, TNA.

¹¹⁷ 'Future war production planning', memorandum by the Ministry of Defence, DC (55) 38, 16 Sep. 1955, CAB 131/16, TNA.

industries, but fell far short of Britain's traditional role as an arsenal for its allies. It was also clear that the fighting of a global war would be done by the forces available at the outset of the war, and not by forces raised by mass mobilisation, as in the First and Second World Wars.

In June 1956 Eden set up a policy review in which ministers would examine the future of the United Kingdom in world affairs. He believed that the government's political and military objectives should be, first, to avoid global war; and, second, to protect vital overseas interests, particularly access to oil. These objectives in turn depended, he said, upon keeping the United States and Canada involved in Europe; developing closer co-operation with these two countries; and maintaining the cohesion of the Commonwealth.¹¹⁸ As Baylis points out, the Chiefs of Staff's influence on the review was minimised by their inability to agree on a joint report on global strategy. Instead, ministers received two papers in July, one by the CAS, emphasising the nuclear deterrent; the other by the First Sea Lord and the CIGS, emphasising the continuing need for conventional forces. The CAS claimed that war would be avoided, even after the Soviet Union achieved nuclear parity with the West, so long as each side was capable of inflicting an unacceptable degree of damage on the other. The navy and army paper argued that, once there was nuclear parity, it could no longer be assumed that the Americans would use nuclear weapons unless their own immediate safety was threatened. In such a situation conventional forces would be required to ensure that the Soviet Union could not achieve its objectives in Europe.¹¹⁹ The case for more expenditure on conventional forces was reinforced by the experience of the Suez operation, when it was discovered that the RAF's bomber force – predominantly Canberras, but including four squadrons of Valiant V-bombers – was not prepared for overseas service. In particular, Bomber Command's navigation and targeting equipment was deficient once it was out of range of radar beacons in Western Europe, and the need for air-transportable equipment for future limited wars was identified.¹²⁰ The operation could not have gone ahead at all without the support of the navy's carrier-borne aircraft and helicopters, as well as its specialised ships for amphibious landings.¹²¹

The final paper for the policy review, by the Minister of Defence, Head, in December 1956 frankly admitted that it had not been possible

¹¹⁸ Policy Review minutes, 9 June 1956, and PR (56) 11, 15 June 1956, CAB 134/1315, TNA.

¹¹⁹ Baylis, *Ambiguity and Deterrence*, pp. 214–15.

¹²⁰ Wynn, *RAF Nuclear Deterrent*, pp. 129–34.

¹²¹ Grove, *Vanguard to Trident*, pp. 183–97.

to agree on a long-term defence programme that would enable Britain to fulfil its political commitments and yet be within its economic means. He suggested that the way ahead was to make a firm plan for reducing the size of the forces to what could be afforded and to reduce commitments to what these smaller forces could cope with. The size of the nuclear deterrent, he thought, was arguable, but it must be seen to be 'a significant contribution'. The army and the tactical air force in Germany should be reduced by as much as would not jeopardise the continued existence of NATO. The forces in the Middle and Far East should be reviewed in the light of the assumptions that they would be deployed within the Baghdad Pact and SEATO, and that Britain was unlikely to engage in a limited war on her own. Increased mobility of air power and air transport would enable lightly armed and equipped mobile forces to intervene speedily for internal security and Commonwealth policing. The navy must be smaller, but more modern, with two fleet carriers and one light fleet carrier, and other ships, such as guided missile destroyers, to make 'a tolerably balanced fleet'. Head had hopes that co-operation with the Americans could reduce the cost of a research and development programme. One of Eden's last acts as prime minister was to authorise him to work out, in conjunction with the service ministers, a long-term defence policy based on a reduction in uniformed manpower from the current strength of 720,000 to 450,000.¹²²

The immediate outcome of the policy review was the Sandys White Paper of April 1957.¹²³ There was, of course, no time to have an extended review of defence policy in about three months, and the Chiefs of Staff were unable to agree on a united front comparable to the Global Strategy paper of 1952. While it is possible to see strategic policy evolving towards greater dependence on the deterrent, following the American hydrogen bomb tests in 1954, Martin Navias is right to emphasise the *discontinuity* between pre-1957 and post-1957 developments. The 1957 White Paper was a response to a perceived need to preserve the economic stability required to sustain Britain's influence in world affairs, and nuclear weaponry offered the means to have international political influence despite a radical reduction in expensive conventional forces. On the other hand, it is more debatable whether Navias is right in stating that the Suez failure was a necessary condition for change, if by change he means the shift in balance between conventional and nuclear forces.¹²⁴ The Suez operation pointed to a need

¹²² PR (56) 45, 'Long term defence programme', memorandum by the Minister of Defence, 14 Dec. 1956, and PR (56) 50, note by the Prime Minister, 24 Dec. 1956, CAB 134/1315, TNA.

¹²³ Cmnd 124. ¹²⁴ Navias, *Nuclear Weapons*, pp. 243–4.

for better, more mobile, conventional forces, for operations outside Western Europe, and to that extent acted as a brake on increasing dependence on nuclear forces.

In the defence review that preceded the White Paper the chairman of the Chiefs of Staff Committee, Dickson, directed the Joint Planning Staff to take account of the need for a deterrent; the limitations imposed by obligations to NATO, the Baghdad Pact and SEATO; internal security commitments in the Middle and Far East; and, in the light of recent events in Egypt, 'the problems imposed by the very real barrier between the Mediterranean and the Indian Ocean'. On the last point, Mountbatten, as first sea lord, thought that the problem of probable closure of the Suez Canal in times of crisis should be met by organising three carrier groups that would rotate between the Mediterranean and the Indian Ocean, with relief of ships in the Indian Ocean always taking place there. Discussion of the Joint Planning Staff's subsequent paper followed the usual departmental lines, with the CIGS, Sir Gerald Templer, pointing out that the need for a British contribution to the nuclear deterrent should not be tied to any particular figure for aircraft; Mountbatten and Templer arguing for more emphasis on support for NATO, the Baghdad Pact and SEATO; and the CAS, Boyle, describing the proposed reduction in Fighter Command in advance of the deployment of SAMs as 'a serious, calculated risk'.¹²⁵

Ministers' discussions on defence policy early in 1957 took place during a sterling crisis. In the Defence Committee Macmillan made plain the extent to which the exercise was driven by economics rather than by strategy. The 'main objective' was to bring the armed forces below a ceiling of about 380,000 (a 15 per cent reduction from Eden's figure) as soon as possible, and not later than the end of 1962. The figure of 380,000 was fixed in terms of what the services could reasonably expect to recruit as regulars, and was not related to commitments. The number of kiloton and megaton bombs that could be produced would depend upon costs, and not upon the number of bombers. The size of the V-bomber force would be related to the need not to incur cancellation charges for Mark I aircraft for which contracts had already been signed, plus the additional numbers of Mark II versions required for the Blue Steel powered bomb, once it became available. Macmillan said that it could be assumed that 'we should not use strategic nuclear weapons except in alliance with the USA', and the aim,

¹²⁵ Confidential annexes to COS (57) 6th meeting, 15 Jan., and 8th meeting, 29 Jan., 1957, 'Long term defence policy', report by Joint Planning Staff, JP (57) 8 (Final), 24 Jan. 1957, DEFE 4/94, TNA.

therefore, was to have sufficient nuclear weapons under British control 'to provide a deterrent influence independent of the USA'.¹²⁶ The White Paper claimed that scientific advances had become sufficiently clear to enable a comprehensive reshaping of policy, but in view of uncertainty about the prospects of Anglo-American collaboration on thermonuclear weapons, the future of Blue Streak, and Air Staff doubts about the ability of SAMs to replace fighters, it is hard to believe that new developments in weapons technology were the proximate cause of policy changes.¹²⁷

It is also possible to exaggerate the clarity with which the White Paper outlined future defence policy. It was revolutionary in confining air defence to the protection of bomber bases, but it was vague about the 'modest contribution' that the V-bombers and Thor missiles would make to the Western deterrent. The army's position that nuclear-armed air power was not a complete deterrent, because the frontiers of the free world had to be defended on the ground, was retained. The big change in policy in this respect was not based on a strategic assessment of the Soviet threat but rather a determination that Britain's disproportionately large contribution of conventional forces should be reduced. The BAOR would be cut from 72,000 to 64,000 men during the next twelve months, with further reductions thereafter; and the tactical air force and light bomber force assigned to NATO would be halved. The two Territorial Army divisions hitherto earmarked as reinforcements for NATO were to be trained and equipped only for home defence duties, like the rest of the Territorial Army, as the time taken to make Territorial field units ready for action, three months, meant that they would be of little value in a nuclear war.¹²⁸ The ghost of broken-backed warfare continued to haunt decisions on the navy, whose role in a major war was described as 'somewhat uncertain' (reflecting Sandys' doubts about aircraft carriers), but, in line with Admiralty arguments, it was stated that there was the 'possibility that the nuclear battle might not be decisive', and that in that event the protection of Atlantic communications against submarine attack would be of 'great importance'.¹²⁹ Commitments to the Baghdad Pact and SEATO, and the Commonwealth,

¹²⁶ Defence Committee minutes, 27 Feb. 1957, CAB 131/18, TNA.

¹²⁷ Cmnd 124, para. 5. See also para. 9, where it is stated that rapid progress in scientific development made it difficult to foresee the future.

¹²⁸ *Ibid.*, paras. 12, 15–17, 20–3, 56.

¹²⁹ *Ibid.*, para 24. Sir Richard Powell thought that the statement that the role of the navy in global war was uncertain caused more trouble than any other part of the White Paper – 'The move to the Sandys White Paper of 1957' witness seminar held July 1988 (Institute of Contemporary British History, 2002, <http://www.icbh.ac.uk/icbh/witness/sandys/>), pp. 28, 32.

remained, but the greater mobility made possible by air transport would allow overseas garrisons to be reduced, and the navy was 'another effective means of bringing power to bear' in limited hostilities, with the aircraft carrier 'increasingly significant' as a mobile air station. Apart from reductions in the air defence of the United Kingdom and in conventional forces assigned to NATO, the big switch in resources was to be in research and development, and here the RAF was to suffer along with the other services. The development of a supersonic manned bomber was abandoned as well as that of manned fighters.¹³⁰ The White Paper left a good deal of detail to be settled as regards global strategy, but it did make change inevitable by announcing that conscription would end, thereby forcing the services to work out what could be done with reduced manpower.

The rest of 1957 was spent in working out the implications of the White Paper. Macmillan was closely involved through private discussions with Sandys. There were close contacts between the Prime Minister's Office and the Treasury as well as with the Cabinet Office. It was Treasury officials who drew attention to the spiralling unit cost of Vulcans and Victors, with the consequence that the Defence Committee was persuaded that the V-bomber force's target strength should be reduced from 184 to 144.¹³¹ The issues that Macmillan was particularly interested in were: first, the army's requirements for tactical atomic weapons during the next ten years and the extent to which it was necessary to produce the weapons and warheads in Britain; second, the threat of air attack on Britain in the next ten years, and the arguments on which air defence plans were based; and, third, the role of the navy, including its contribution to the deterrent.¹³² Regarding Macmillan's first question, the army received American tactical nuclear missiles from the United States in 1960 but development of Britain's own Blue Water continued until 1962. Regarding the second question, the CAS was able to salvage only a residual role for fighter defence of the deterrent (see pp. 286–7).

During discussions of the third question, the role of the navy, the carrier force and the FAA were identified as possible targets for major economies. However, as ever, the Admiralty put up a powerful defence: it pointed out that the Australian, Canadian and Indian navies were designed around the aircraft carrier. To abandon the FAA would be to

¹³⁰ Cmnd 124, paras. 25–39, 58–63.

¹³¹ D. R. Serpell to B. D. Fraser (third secretary, Treasury), 'Strategic bomber force', 30 July 1957, enclosing memorandum by T. Bligh of same title and date, PREM 11/1773; Defence Committee minutes, 2 Aug. 1957, CAB 131/18, TNA.

¹³² Macmillan to Minister of Defence, 3 Aug. 1957, PREM 11/1773, TNA.

force these countries to adopt American aircraft, 'and destroy for ever the position of leadership and influence which this country enjoys in Commonwealth naval affairs'. Britain would also be moving against the international trend, as France and the Netherlands had carriers, and even smaller navies such as those of Argentina and Brazil were forming carrier forces. Prophetically, the Admiralty also pointed out that it was possible that limited war operations might have to be undertaken in the Far East outside of SEATO: for example, in Borneo or Indonesia. By late July, Macmillan's principal private secretary, Frederick Bishop, was advising him that abolition of the FAA was 'a political impossibility for international and prestige reasons'.¹³³ The Admiralty also argued that naval forces provided a deterrent, not in the sense of the nuclear option represented by the V-bombers, but because naval forces assigned to NATO or showing the flag played a large part in preventing war.¹³⁴

In 1958 the Chiefs of Staff addressed the question of what would happen after 1960–2, when the Soviet Union was expected to achieve what was called 'nuclear sufficiency', that is possession of enough nuclear warheads and effective delivery systems to enable it to destroy any targets it wished in a global war. The CIGS, Templer, argued that the deterrent would cease to be credible outside the NATO area, and Mountbatten thought that both the British and American governments would be reluctant to use the deterrent at all. Consequently limited wars would become more likely and conventional weapons might resume much of their original importance.¹³⁵ The 1958 Defence White Paper's statement that, if the Soviet Union were to launch a full-scale attack with conventional forces only, the Western powers would have to respond with 'a massive nuclear bombardment of the sources of power in Russia' reflected the CAS's views.¹³⁶

The White Paper was able to cite official NATO strategy in support of reliance on nuclear deterrence. However, the American administration was concerned about the extent of proposed British cuts in conventional forces and, as noted above (see p. 281) seems to have hoped that Anglo-American nuclear collaboration would make these reductions unnecessary, since the British would be saved the expense of research and

¹³³ Joint Planning Staff, 'The Fleet Air Arm', 18 Feb. 1957, DEFE 4/95; F. Bishop to Prime Minister, 29 July 1957, PREM 11/1773, TNA.

¹³⁴ Minutes of meeting held in Ministry of Defence, MISC/M (57) 91, 12 Aug. 1957, DEFE 7/968, TNA.

¹³⁵ 'The effects of nuclear sufficiency', by CIGS, COS (58) 39, 13 Feb. 1958, DEFE 5/82, and confidential annex to COS (58) 77th meeting, 3 Sep. 1958, DEFE 4/111, TNA; Mountbatten to Templer, 13 June 1958, MB 1/I106, Hartley Library, Southampton University.

¹³⁶ *Britain's Contribution to Peace and Security* (Cmnd 363), PP 1957–58, xxi. 465.

development. This policy was pursued to its logical conclusion in the Skybolt and Polaris agreements. The latter in particular had a dramatic effect on the financial burden of the deterrent. In 1962 the nuclear deterrent absorbed about 10 per cent of the defence budget.¹³⁷ Between 1966/7 and 1969/70 capital expenditure on the Polaris system was at its peak, with the construction of the 'Resolution'-class submarines, but total expenditure on the deterrent (V-bombers; submarines and Polaris missiles; materials for nuclear bombs, warheads and submarine reactors; and research and development) fell as a proportion of the total defence budget, from 8.9 per cent to 5.01 per cent. Much of this reduction was due to the phasing out of the V-bombers but research and development costs were cut by 30 per cent. More savings were to follow in the 1970s, once the construction of the submarines was complete.¹³⁸ As nuclear deterrents go, the Polaris agreement was a bargain for Britain.

The alternative would have been to follow the example of France, which developed an indigenous nuclear deterrent. From 1964 to 1971 the French relied exclusively on the Dassault Mirage IV bomber which, although supersonic, was limited in range, so that missions of a strategic rather than tactical nature could only be undertaken with in-flight refuelling. The only American input was the sale of Boeing jet tanker aircraft for this purpose. Later, in the 1970s, the French introduced submarine-launched and land-based strategic missiles, but found the expense of building silos for all of the latter too great. The French deterrent was small, and apart from the submarine element, vulnerable. Nevertheless, in the 1960s French strategic thinkers were prepared to argue that the French *force de frappe* would still deter as it could act as a detonator of the American nuclear forces. This argument was not one calculated to appeal to the United States, especially given President de Gaulle's concept of French sovereignty, which extended to a refusal to have American nuclear weapons on French territory or to co-ordinate targeting policy with allies.¹³⁹

The British policy of interdependence with the United States was not without its disadvantages. As Baylis has pointed out, collaboration with the Americans in targeting made it difficult to pursue an independent strategy of how to employ nuclear forces. The original targeting strategy for the V-bomber force, as presented to the Swinton Committee in 1954, had been to strike at Soviet bomber bases, so as to reduce the scale of the nuclear attack on the United Kingdom (see pp. 319, 320).

¹³⁷ *Statement on Defence 1962: The Next Five Years* (Cmnd 1639), PP 1961–62, xxvii. 459, para. 13.

¹³⁸ Figures calculated from appendix 3 to Freedman, *Britain and Nuclear Weapons*, p. 144.

¹³⁹ Paterson, *Britain's Strategic Nuclear Deterrent*, pp. 138–45.

However, in April 1955 the head of Bomber Command, Sir George Mills, argued that deterrence would be better achieved by threatening centres of population and administration rather than military targets. As a result of his initiative, Bomber Command was directed to plan on the basis of destroying the enemy's will to fight in the shortest possible time. Combined planning with the US Strategic Air Command from 1957–8 led to a shift back to military targets, including bomber bases and IRBM sites, although the British Global War Studies Committee reported in March 1959 that a purely counter-force strategy was no longer credible, as it was unlikely that either side could knock out all of the other's nuclear forces. From 1958 British strategic plans had two separate lists of targets, one for joint action with the United States and one for unilateral action; even so, whereas the 1958 unilateral plan targeted forty cities, in 1962 there were only fifteen on the list. Baylis concludes that there was a lack of agreement at the highest levels of British government on the true purpose of Britain's nuclear deterrent, whether it was for deterrence or for fighting a war.¹⁴⁰

With the advent of the Kennedy administration in 1961 account had to be taken of American pressure to revise NATO strategy away from massive retaliation and towards a more flexible and controlled response to aggression. The Chiefs of Staff were opposed to American attempts to plan for a nuclear war confined to Europe, since for a small country like Britain the distinction between a limited nuclear war and an unlimited nuclear war was meaningless. British military planners also doubted whether a nuclear war, once started, could be confined to tactical weapons. There was also the political objection that adoption of the doctrine of flexible response might make a nuclear option seem less dangerous to Soviet decision-makers. It was not until 1967 that NATO accepted a flexible response strategy, and then with continued British reservations.¹⁴¹ Nevertheless, it says much for the strength of the Anglo-American nuclear partnership that Kennedy was willing to entrust the British with the Polaris system. The Americans would have preferred the British to commit their Polaris submarines to a NATO multinational nuclear force, and were aware that support for an independent British deterrent could be damaging to relations with France. Nevertheless, the Nassau Agreement contained an opt-out clause whereby the British Polaris forces

¹⁴⁰ Baylis, *Ambiguity and Deterrence*, pp. 273–4, 288–90, 304–6, 365–6, 367–9.

¹⁴¹ 'Decisions taken at the meeting of the [NATO] Defence Planning Committee in ministerial session, held on 9 May 1967', Annex I to DPC/D (67) 23, reproduced in *NATO Strategy Documents*, pp. 335–44.

assigned to NATO could revert to national control when Britain's vital interests were at stake.¹⁴²

The American doctrine of flexible response also had implications for the extent to which reliance should be placed on conventional weapons. Despite the long-standing division between the RAF on the one hand, and the army and the navy on the other, on this issue, the Chiefs of Staff Committee agreed in January 1963 that an increase in NATO conventional forces on the scale contemplated by the American Secretary of Defense, McNamara, was economically impracticable, and would weaken the credibility of the nuclear deterrent. Moreover, even if NATO succeeded in creating a force of thirty combat-ready divisions in Western Europe, compared with the existing twenty-five under-strength divisions, the Warsaw Pact would be able to mobilise ninety-one divisions against them within ten days. British military planners went along with the doctrine of flexible response to the extent of agreeing that there had to be a shield of conventional forces sufficiently strong to resist infiltration and small-scale aggression, and to be able to delay larger-scale aggression long enough for a political solution to be attempted before resort to tactical or strategic nuclear weapons. Doubts persisted about the consequences of the early employment of tactical nuclear weapons. Ministers were warned that, although the use of a very small number of low-yield nuclear weapons would convey a powerful warning of Allied determination and might cause the Soviets to halt their aggression, 'alternatively it might cause them to proceed at once to a pre-emptive strategic strike'.¹⁴³

The likelihood that British strategy would place less emphasis on the deterrent was increased by the appointment in 1959 of Mountbatten as CDS, given the doubts he had expressed the previous year about whether the West would ever use nuclear weapons.¹⁴⁴ The 1961 Defence White Paper pointed out that many of Britain's most important responsibilities were not concerned with direct deterrence of nuclear war but rather with the checking of small conflicts that might develop into one. There was a need for rapid-reaction forces capable of dealing with a whole spectrum of possible aggression and military threats.¹⁴⁵ The 1962 Defence White Paper stressed the need for NATO forces and strategy to be balanced and flexible, and noted the re-equipment of the army with

¹⁴² Clark, *Nuclear Diplomacy*, pp. 409–20; Constantine A. Pagedas, *Anglo-American Relations and the French Problem 1960–1963* (London: Frank Cass, 2000), pp. 238–56.

¹⁴³ 'A British view of strategy for the defence of Central Europe', COS 34/63, 23 Jan. 1963, DEFE 5/134, TNA.

¹⁴⁴ See p. 327.

¹⁴⁵ *Report on Defence* (Cmnd 1288), PP 1960–61, xxiv. 463, paras. 6–9, 11.

new anti-tank weapons and the orders placed for a new heavy tank (the Chieftain), with the clear intention of strengthening BAOR's ability to resist Soviet conventional forces. As for the navy, the mobility and versatility of seaborne power was praised, and the intention to replace the existing carriers announced.¹⁴⁶ Flexible response had replaced 'broken-backed' warfare as the rationale for conventional forces prepared for global warfare. Mountbatten accepted that the rising cost of weapons systems meant that plans for the next ten years must be based on the steady reduction of manpower and commitments. His own belief was that Britain's special relationship with the United States was best maintained through her world role – 'the heritage of the Empire', as he called it – and that her contribution to NATO could best be made with amphibious forces operating on the flanks of NATO in Scandinavia and the Mediterranean rather than with the BAOR in Germany.¹⁴⁷

Global strategy: retreat from East of Suez

Harold Wilson told the House of Commons on 16 December 1964 that, while the government was reviewing defence expenditure with a view to increasing cost-effectiveness, Britain could not afford to relinquish its world role, 'which for shorthand purposes is sometimes called our East of Suez role'.¹⁴⁸ Nevertheless, his government decided in November 1965 to withdraw from the Persian Gulf as well as Aden, and in 1967–8 to withdraw from Singapore and Malaysia. Jeffrey Pickering has suggested that, given American support for Britain's presence in the Far East, Britain's East of Suez role might well have survived had Wilson not appointed Roy Jenkins as James Callaghan's successor when the latter resigned as chancellor of the exchequer after the devaluation of sterling in 1967.¹⁴⁹ Jenkins certainly proved to be a powerful opponent of the East of Suez role in his search for economies. Saki Dockrill, however, has shown that there is plenty of evidence to support the traditional view that Britain's withdrawal was part of a lengthy process involving retrenchment in defence since the 1950s and growing links with continental Europe.¹⁵⁰ Placed in the context of the evolution of British

¹⁴⁶ Cmnd 1639, paras. 14, 26–7, 29.

¹⁴⁷ Drafts dated 4 and 19 Nov. 1962 for Minister of Defence's longer term strategy paper, and CDS to Minister, 9 Nov. 1962, MB 1/J58, Hartley Library, Southampton University.

¹⁴⁸ 704 HC Deb., 5s, 1964–65, cc. 423–4.

¹⁴⁹ Jeffrey Pickering, *Britain's Withdrawal from East of Suez: The Politics of Retrenchment* (London: Macmillan, 1998), esp. pp. 180–1.

¹⁵⁰ Saki Dockrill, *Britain's Retreat from East of Suez: The Choice between Europe and the World* (Basingstoke: Palgrave, 2002).

global strategy, the decision can be seen to be the outcome of exhaustive reviews of strategic options over a number of years. There were, in theory, other options: the nuclear deterrent might have been abandoned or NATO commitments might have been cut further. Some major adjustment was inevitable as ministers became increasingly aware of the problem of overstretch – too many commitments for the reduced size of the armed forces.

The Treasury had set its sights on the East of Suez role as a suitable target for economy as early as July 1960. Sir Richard Clarke, a leading official on the public expenditure side of the department, noted in a brief for the Chancellor before a meeting of the Defence Committee that costing the defence budget for the five years 1961/2 to 1965/6 showed that the defence departments would be very hard pressed to keep within the growth of GNP. He added that the key to the defence budget was the Far East: 'If we could only abandon this role, the whole of our defence effort could be tremendously reduced (and consequently made much more effective).' Clarke dismissed the case for maintaining forces at the Singapore base to defend Britain's economic and commercial interests. 'Can we nowadays defend such interests by force?' he asked rhetorically. In any case, British investments in South and South-East Asia, including India, yielded only £60 million to £65 million a year, whereas annual defence expenditure in the region was not far short of £60 million. 'Imagine a fire insurance premium of 100 per cent!' he commented. Very similar arguments applied to the Middle East. In 1960 Clarke thought that the costs of defence there were not quite as high in relation to earnings as in the Far East, although too high by the fire insurance test. By March 1963, however, he calculated that the cost, £120 million to £125 million a year, had risen above the profits of British oil companies, £100 million a year. At that date he estimated that the total cost of defence commitments throughout the entire East of Suez region took about one-third of the defence budget, excluding research and development, or about 2 per cent of GNP. About three-quarters of this expenditure was incurred in the Far East.¹⁵¹ Decision-making in Whitehall was not driven solely by Treasury cost-benefit analysis – the Ministry of Defence and the Foreign Office thought in terms of containing Soviet expansion or Communist subversion, and of maintaining British prestige – but the projected rising curve in defence budgets concentrated the collective mind of Whitehall.

¹⁵¹ R. W. B. Clarke, 'Defence Committee: Wednesday 27th July', 25 July 1960, CLRK 1/3/1/2, and Clarke to Sir William Armstrong, 'Defence East of Suez', 1 Mar. 1963, CLRK 1/3/2/4, Churchill College, Cambridge.

A major reappraisal of defence policy was undertaken in 1963 after the Minister of Defence, Thorneycroft, warned in February that defence expenditure could not be held at 7 per cent of GNP in the latter half of the 1960s with the existing range of commitments. He told his Cabinet colleagues that the increasing cost of modern weapons meant that defence expenditure would rise as a proportion of GNP unless the size of the forces was reduced. The Defence Committee supported the Chancellor of the Exchequer, Maudling, in deciding that defence expenditure should not be allowed to go above 7 per cent of GNP. The question of the deterrent and its cost had been settled only two months previously, and therefore the search for economies focused on commitments in Europe, the Middle East and the Far East. Britain was bound by the WEU treaty to maintain 55,000 men in Europe, but ministers believed that an attempt should be made to persuade the Americans and other allies that a major reduction of Britain's forces in Europe would be preferable to a reduction in her commitments East of Suez. Meanwhile, apparently influenced by Clarke's approach, Macmillan arranged for studies of the cost of staying in Aden in relation to the value of the investments it was designed to protect, and the economic and political consequences of withdrawing or reducing substantially the forces based in Hong Kong and Singapore. Weapons programmes were not exempt from scrutiny. Aircraft carriers had been targets for economising ministers since the Swinton Committee in 1954, and the Admiralty was asked to report on the carrier replacement programme and what alternative arrangements would be necessary for re-equipping the navy if it were decided not to build new ones. The Ministry of Aviation was asked to study the aircraft replacement programme, and in particular the projected P.1154 VTOL strike fighter for the air force and navy, and the Ministry of Defence initiated a study of the possibility of dropping the TSR-2 in favour of a cheaper alternative.¹⁵²

In the light of the various studies, the Cabinet Secretary, Trend, advised Macmillan in June that it should be confirmed that there could be no change in plans for the Polaris submarine fleet or, in the foreseeable future, any substantial change in Europe. There was, he noted, room for argument on the Middle East, with the Foreign Secretary, Lord Home, advocating the retention of forces to defend Britain's oil interests, and the Treasury claiming that oil was protected by the Middle Eastern countries' need to sell it. Trend agreed with the strategic argument that a Soviet invasion of the Middle East would not be

¹⁵² Defence Committee minutes, 9 Feb. 1963, CAB 131/28; Thorneycroft to Prime Minister, 24 Apr. 1963, PREM 11/4731, TNA.

deterred by the base at Aden, which was too far south, and that the most effective response to an invasion would be by the RAF's nuclear bombers based in Cyprus. He foresaw the relegation of Aden to a mere staging post. As regards the Far East, Trend thought that there was even more room for argument. The Foreign Secretary was once more opposed to running down British forces, but Trend pointed to the possibilities of economies once the confrontation between Malaysia and Indonesia had been resolved, and if Australia and New Zealand could be persuaded to play a larger part in the defence of South-East Asia. As regards the future of the navy's aircraft carriers, Home had said that he could conceive of no circumstances in the 1970s in which British forces would be required to make opposed landings in the Middle East or the Far East, and Trend thought that the main justification for the very expensive carrier replacement programme was thereby removed.¹⁵³ In the event, the Foreign Office blocked withdrawal from Aden and a decision on Singapore was deferred pending a solution to the confrontation with Indonesia.

Ministers had avoided taking any hard decision on the deterrent, Europe, Aden, Singapore or the carrier programme in the summer of 1963, but Trend pointed out in July of that year that a policy of miscellaneous cuts and making weapons last longer could not be a long-term solution. The Chiefs of Staff also warned that the process of scraping the barrel could not continue without the forces being spread so thin as to risk a disaster. Trend suggested that the way forward was to lay down broad political assumptions, together with a firm financial ceiling, and to consider what forces could be provided for that money and how far they could carry out the commitments implied by the political assumptions. For example, if it were assumed that by 1970 Britain would not maintain bases at Aden or Singapore, or mount opposed landings East of Suez, it might still be possible, within a budget not exceeding 7 per cent of GNP, to maintain 'some' deterrent capability; a 'reasonable' contribution to the defence of Europe; no standing garrisons overseas, but a 'really efficient' mobile reserve able to respond to calls for help from any friendly power. There might be no need for aircraft carriers for any of these purposes.¹⁵⁴ The shape of Healey's

¹⁵³ Trend to Prime Minister, 18 June 1963, PREM 11/4731. Trend was drawing upon a study prepared for senior officials by Michael Carey, deputy secretary to the Cabinet, 'Future policy in the Middle East and Far East', May 1963, CAB 21/5902, TNA. For Cary's review of Britain's role East of Suez, see Ross Christie, "'Britain's crisis of confidence': how Whitehall planned Britain's retreat from the extra-European world, 1959-1968", Ph.D. (University of Stirling, 2004), pp. 221-5, 281, 286.

¹⁵⁴ Trend to Prime Minister, 'Future defence policy', 9 July 1963, PREM 11/4731, TNA.

defence policy was being foreshadowed in the Cabinet Office even while Macmillan was still at 10 Downing Street.

Trend noted that controversy over the carrier replacement programme had raged in Whitehall since 1960, with the Air Ministry and Treasury opposed to new ships and the Admiralty, supported by the CDS, Mountbatten, claiming that carriers were an essential part of the fleet. The Air Ministry argued that combat and transport aircraft operating from bases on islands such as Ascension, Tristan da Cunha and Diego Garcia would be more cost-effective than carriers. A panel of scientists under the chairmanship of the Chief Scientific Adviser, Zuckerman, had concluded in April 1963 that the carrier was technically superior for air defence and air support in the case of a landing against low or moderate opposition. For example, tanks that would be effective in combat could not be transported by air, and seaborne transport was better for supplies generally. Zuckerman doubted the political possibility of retaining island bases in the 1970s or whether Britain would intervene against strong opposition without American support.¹⁵⁵ By July Trend felt that a decision in favour of one replacement carrier was politically inevitable. Failure to place an order, he advised Macmillan, would be taken by public and overseas opinion to be a decision to abandon Britain's world-wide role, although ministers had decided, if only implicitly, that Britain could not do that. However, Trend clearly foresaw the difficulty of keeping defence expenditure within the 7 per cent of GNP limit, as he added: 'we must accept the probability that, when the time comes, we shall decide not to replace the last two carriers; and that we must also accept the risk that even the single replacement now in question may be obsolescent by the time that it is completed (or may have to be transformed, during its construction, into some sort of missile carrier)'.¹⁵⁶ The new carrier, CVA 01, was approved but was still a design project when the Conservatives lost the general election of 1964.

On taking office in October the Labour government undertook a review of defence policy for the next ten years, with the objective of relieving the strain on the economy. Plans centred on the target of bringing defence expenditure down to a stable level of 6 per cent of GNP: £2,000 million at 1964 prices or 16 per cent below what the Conservatives had contemplated for 1969/70.¹⁵⁷ Healey, as secretary of

¹⁵⁵ 'Report of enquiry into carrier task forces', 22 Apr. 1963, MB 1/J61, Hartley Library, Southampton University.

¹⁵⁶ Trend to Prime Minister, 'Defence programme: aircraft carrier replacement', 29 July 1963, PREM 11/4731, TNA.

¹⁵⁷ *Statement on the Defence Estimates, 1966. Part 1, the Defence Review* (Cmnd 2901), PP 1965–66, ix. 1.

state for defence, was also much concerned with service manpower being dangerously overstretched in relation to commitments. 'We are, in fact, gambling on not having to fight more than one major campaign at a time', he commented.¹⁵⁸ In 1964 Britain had more service manpower East of Suez than in Germany, with major bases at Singapore and Aden, and smaller bases at Labuan, in Borneo, and Bahrain; an air staging post at Gan in the Indian Ocean; and a garrison at Hong Kong. There were active operations in Borneo against the Indonesians, and in the newly established Federation of South Arabia against Arab nationalists.

It seems to have been Trend who steered the defence review in the direction of reducing commitments East of Suez. From previous experience he knew that the Foreign Office would always argue for protecting British interests and maintaining obligations, and would therefore attempt to block changes in the overseas deployment of British forces. Consequently, in advance of ministers' discussions on defence policy at Chequers in November 1964, he arranged for officials to prepare a memorandum that studied the problem from the opposite angle. Starting from the assumption that, for economic or political reasons, Britain would be unable in five or ten years' time to maintain a military presence on the present scale at Singapore, Aden and in Germany, the paper studied the probable effects on British interests of withdrawing wholly or in part from each of the three areas, and their relative importance. The memorandum identified the BAOR as the most important commitment, on the grounds that its presence was necessary for the political cohesion of NATO. Aden was rated second in importance, on account of Middle Eastern oil, although there were doubts about whether a military presence in Aden could protect commercial interests in the Gulf. Singapore came third, because the economic interests that it protected, although not small, were less important than those in the Middle East, and because the political significance of Singapore would decline once the confrontation with Indonesia was over. Ministers agreed that a choice would have to be made between the three roles but thought that Britain's allies must be consulted first.¹⁵⁹

Discussions between the Chancellor of the Exchequer, Callaghan, and McNamara in June 1965 revealed that the latter was concerned about a collapse of NATO, brought about not only by a reduction of British forces in Germany but also by de Gaulle's attempts to change the

¹⁵⁸ Healey, 'The defence review: a personal note', 11 June 1965, PREM 13/215, TNA.

¹⁵⁹ Trend to Prime Minister, 'Defence policy – Chequers discussions', 19 Nov. 1964, PREM 13/18; Defence Policy, MISC17/1st meeting, 21 Nov. 1964, CAB 130/213, TNA.

structure of the organisation (nine months later France withdrew its military forces from the alliance).¹⁶⁰ There was a strong financial incentive to reduce the size of the BAOR, on account of the cost in foreign exchange of maintaining forces in Germany, a cost that the Germans were unwilling to offset to the extent that the British felt would be adequate. Both Roy Jenkins, who went as minister of aviation to Washington in June 1965 to discuss British purchases of American aircraft to replace cancelled British projects, and Callaghan found that McNamara was helpful in negotiating financial terms and offsetting purchases, so as to ease foreign exchange problems. The Americans were also willing to provide support to the Bank of England in its defence of sterling. McNamara made plain that in his judgement Britain had to maintain its commitments in the Indian Ocean for at least the next ten years. He warned that neither Congress nor the American people would tolerate a situation in which the United States was the sole world policeman.¹⁶¹

Given American commitments in South-East Asia, especially the war in Vietnam, it was understandable that McNamara told Wilson in December 1965 that he rated maintenance of British strength in Asia and the Far East even more highly than her presence in Europe. When Wilson, who was clearly trying out ideas on the Americans, suggested that, in response to China becoming a nuclear power, Britain's Polaris submarines could be deployed as part of some collective defence arrangement in the Far East, McNamara expressed great interest, and asked what the submarines' strategic role would be, and whether they might be linked to a commitment to India.¹⁶² The possibility of deploying Polaris submarines in an East of Suez role was still being considered by the Cabinet's Defence and Overseas Policy Committee in June 1967, when a decision was deferred until October.¹⁶³ In the event, the Committee did not return to the question, perhaps because by the autumn the pressure on sterling that was to lead to devaluation in November precluded any discussion of additional commitments.

For Healey, one of the key issues in the defence review was the future of Britain's aircraft carriers, both from the point of view of possible

¹⁶⁰ Note of meeting in State Department, 30 June 1965, PREM 13/216, TNA.

¹⁶¹ Sir Patrick Dean (British Embassy, Washington) to Sir Paul Gore-Booth (British High Commission, New Delhi), 10 June 1965 (two letters), PREM 13/215; note of meeting in State Department, 30 June 1965, PREM 13/216, TNA.

¹⁶² Note of meeting at the British Embassy, Washington, 17 Dec. 1965, PREM 13/799, TNA.

¹⁶³ Defence and Overseas Policy Committee minutes, 26 June 1967, CAB 148/30, and 'Defence expenditure studies', memorandum by the official committee, OPD (67) 46, 21 June 1967, CAB 148/32, TNA.

budgetary savings and for the implications for how East of Suez commitments could be met. He told Wilson in October 1965 that it had become clear from recruitment figures that the navy would not have the manpower for more than three strike carriers in the 1970s (compared with five in 1965). Healey thought that a force of this size would not be cost-effective; especially as FAA aircraft were three times as expensive as RAF aircraft (on account of shorter production runs). On the other hand, without carriers, Britain would be unable to land troops on the coast of a well-armed enemy, and her role would be limited to peace-keeping and a 'quality contribution' to an Allied force. Britain's long-range strike aircraft – the TSR-2 and the P.1154 – had been cancelled but Healey asked for the cost of providing long-range strike and defence capability by the American F-111 aircraft to be investigated as an alternative to carriers.¹⁶⁴ Zuckerman still thought that a strike carrier was the better alternative. To Healey's annoyance, he advised Wilson that the size of F-111 force that the Ministry of Defence was contemplating was less than half of the number of aircraft that the Americans had lost in Vietnam in 1965, and would not be able to blunt the offensive power of an enemy like Indonesia. On the other hand, a carrier-supported task force could ensure command of the seas, which would be essential for transporting heavy equipment, whatever might be done by air with troops. The carrier could provide anti-submarine and strike capability in a flexible way that aircraft, dependent on land bases, could not.¹⁶⁵

By January 1966, ministers dealing with the defence review were offered three choices: first, phase out carriers in 1969/70; second, allow existing carriers to remain in service and lay down a new one to come into service in 1972; and, third (Healey's suggested compromise), allow existing carriers to continue in service for the full length of their useful life, until about the mid-1970s, but not lay down a new one. As Trend pointed out to Wilson, the future of the carriers was crucial to the shape of Britain's forces in the Far East, and there were two reasons why it might be better to delay a final decision. First, as the Ministry of Defence admitted, the system for the operation of land-based aircraft in place of carriers was unproven; second, the need for an independent strike force in the Far East could only be determined after discussions

¹⁶⁴ Note of meeting between Wilson and Healey, 8 Oct. 1965, PREM 13/216, TNA.

¹⁶⁵ Zuckerman to Prime Minister (personal), 14 Nov. 1965, PREM 13/216, and 7 Jan. 1966, PREM 13/799, TNA. Healey complained in his memoirs that Zuckerman would go behind his back to other ministers for help when Healey disagreed with him, and Healey eventually persuaded Wilson to transfer the Chief Scientific Adviser from the Ministry of Defence to the Prime Minister's Office (*Time of My Life*, p. 260).

with the Americans, Australians and New Zealanders about what contribution each would make to a quadripartite arrangement for the defence of South-East Asia.¹⁶⁶ The Navy Minister, Christopher Mayhew, took the view that, if carriers could not be afforded, then the government should announce a withdrawal from East of Suez. When Healey announced in Australia in February 1966 that Britain would maintain its commitments in the Far East, the Middle East and Africa, Mayhew resigned.¹⁶⁷

The outcome of this first Labour defence review was the 1966 Defence White Paper, which stated that the security of the United Kingdom rested mainly on preventing war in Europe and that therefore NATO (to which Britain's nuclear deterrent was committed) was vital to Britain's survival. While Britain would retain a 'major military capability' outside Europe, she would no longer undertake large-scale operations except in co-operation with allies. Despite Zuckerman's and Trend's advice, Healey's compromise with regard to the carriers prevailed: no new carriers were to be built, and the existing force of five carriers would be allowed to decline in numbers to three 'in a few years' time', but these would continue to be able to operate the Buccaneer strike aircraft until 1974–5. The carrier role would gradually be taken over by land-based aircraft for strike, reconnaissance and air defence purposes, with helicopters operating from ships other than aircraft carriers being responsible for the anti-submarine role.¹⁶⁸

A further deterioration in the economic position in 1966 led the Treasury to demand a review of public expenditure, including defence. The problem was that the aggregate of public expenditure was rising faster than GNP, and the armed forces and the East of Suez role were in competition with Labour party commitments in respect of education, health and housing. The Chancellor of the Exchequer suggested in August that the ceiling for the defence budget for 1969/70 should be lowered to £1,850 million, at 1964 prices, instead of the £2,000 million target on which the 1964–6 defence review had been based. Given the government's economic policy of encouraging the movement of labour into industry, Callaghan was also concerned at the way in which public services were absorbing manpower, and in August 1966 he suggested

¹⁶⁶ Trend to Prime Minister, 'Defence review', 18 Jan. 1966, PREM 13/800; 'The future of the carrier force', memorandum by Secretary of State for Defence, OPD (66) 11, and 'Personal note by Secretary of State for Defence', both 14 Jan. 1966, CAB 148/26, TNA.

¹⁶⁷ Defence and Overseas Policy Committee minutes, 1 Feb. 1966, CAB 148/25, TNA; Christopher Mayhew, *Britain's Role Tomorrow* (London: Hutchinson, 1967), pp. 143–53.

¹⁶⁸ Cmnd 2901, PP 1965–66, ix. 1, chap. II, paras. 8–9, 19; chap. III, paras. 3–7.

that the army, which was already being reduced from 181,000 men to 176,000 as a result of the defence review, should be further reduced to the 165,000 to 170,000 bracket 'at a time when our commitments are likely to be decreasing'. Healey responded that economies on this scale could only be achieved by a completely new defence review, and put the necessary work in hand. His lack of resistance can be explained partly by the end of the confrontation with Indonesia in August, but the influence of economic factors is indicated by Trend's comment in October that 'short of a major change in economic policy' (code for devaluation) the position with regard to public expenditure by 1970/1 would be unmanageable.¹⁶⁹ The Treasury was not alone in pressing for a change in policy. In October 1966 a resolution demanding a reduction in military commitments East of Suez, to make possible a defence budget well below £1,750 million, was passed against the government at the Labour party conference.

Since major economies had already been made in defence procurement, with the cancellation of TSR-2 and other projects, the only area of defence policy that offered scope for budgetary savings of the order required by the Treasury was the East of Suez role. By March 1967 interdepartmental studies were working on the assumption that there would be no major change in commitments in the Far East, but that Britain's forces there would be halved by 1971. There was debate on whether there should be further savings through a major reduction in commitments after 1971, with the Foreign and Commonwealth Relations Offices arguing for a delay in a decision to make it possible to adjust policy in the light of events. It was Healey who provided fresh impetus to the review by suggesting that greater savings could be achieved if all British land forces were removed by 1970/1, limiting the commitment to Malaysia and Singapore to naval and air support.¹⁷⁰ The Cabinet decided that consultations with allies should go ahead on the basis of British force levels in South-East Asia being halved by 1970/1, and with the date for eventual withdrawal from Malaysia and Singapore being linked to the possibility of establishing a small air and naval presence in Australia.¹⁷¹ It was at the request of the United States, Australia and New Zealand that the government did not announce its

¹⁶⁹ Callaghan to Healey, 11 Aug., Healey to Chancellor of the Exchequer, 16 Aug., Trend to Prime Minister, 'Defence review: Chequers meeting', 21 Oct. (all 1966), PREM 13/802, TNA.

¹⁷⁰ Trend to Prime Minister, 'Defence expenditure studies', 21 Mar. 1967, PREM 13/1384, TNA.

¹⁷¹ Cabinet conclusions, 11 Apr. 1967, CAB 128/42; Trend to Prime Minister, 3 and 13 Apr. 1967, PREM 13/1384, TNA.

intention to withdraw from Singapore and Malaysia by 1975. British withdrawal at a time when American forces were suffering heavy casualties in Vietnam was a sensitive issue in the United States.¹⁷²

The outcome in July 1967 was a supplementary statement on defence policy, which announced the forthcoming withdrawal from the Aden base in January 1968; a reduction in British forces in Singapore and Malaysia by the early 1970s to naval, amphibious and air units, with some Gurkhas; and a complete withdrawal from the Singapore base in the mid-1970s, the precise time depending upon the creation of a new basis for stability in South-East Asia. The emphasis was on modifications in the composition and location of forces for East of Suez contingencies rather than a revision of commitments. In particular, there was an undertaking 'to maintain a military capability for use, if required, in the area' even when Britain no longer had forces permanently based there, and a statement that Britain would 'probably keep in the Far East some naval and amphibious forces'.¹⁷³

However, there was a further deterioration in the balance of payments in the autumn of 1967. It had been decided two years earlier, for financial reasons, not to retain the right to use defence facilities in the colony of Aden when the projected South Arabian Federation, which was to link the colony and the Aden Protectorate, became independent. The decision to abandon Aden in the face of growing disorder in the colony and the protectorate was taken in October 1967 during the last stages of the attempt to avoid the devaluation of sterling that was forced on the Wilson government on 18 November. Devaluation, it will be recalled, did not ease the pressure on public expenditure, at least in the short term, since resources had to be released from an over-heated domestic economy for the production of exports. Healey warned McNamara on 27 November that, as devaluation began to reduce living standards in Britain, the foreign exchange costs of defence would come under increasing criticism, and highlighted the F-111 order and commitments in Germany and East of Suez.¹⁷⁴ Jenkins, who had replaced Callaghan as chancellor of the exchequer, committed himself to announcing a large package of cuts in civil and defence expenditure by 17 January 1968. At a meeting on 20 December 1967 with ministers and officials from the Foreign Office, the Commonwealth Relations Office,

¹⁷² Record of meeting between the Foreign Secretary (George Brown), the Australian Minister for External Affairs, the New Zealand Prime Minister and the United States Secretary of State, 20 Apr. 1967, PREM 13/1384, TNA.

¹⁷³ *Supplementary Statement on Defence Policy, 1967* (Cmnd 3357), PP 1966–67, liii. 359., chap. III, paras 5–6, 8–10.

¹⁷⁴ Healey to McNamara, 27 Nov. 1967, PREM 13/1999, TNA.

the Ministry of Defence and the Treasury, Jenkins stated bluntly that the government had come to the point of defeat on the economic road and that there was no prospect for success without further material savings in defence expenditure. The government had never wholly given up a commitment yet, and he believed that it was only the shock of devaluation that would make it possible to secure decisions to do so. Healey said that he believed that the only way to make substantial savings was to eliminate altogether particular theatres; cuts spread over all theatres would produce a deployment of forces wholly lacking in credibility. The Foreign Secretary, George Brown, while not excluding the possibility of further economies in Europe, said that, as between Europe and East of Suez, he would prefer economies to be at the expense of the latter.¹⁷⁵ It fell to Wilson to make a statement on 16 January 1968 in which he announced an acceleration of the withdrawal from Singapore and Malaysia, so as to complete the process by the end of 1971, and a decision to withdraw from the Persian Gulf by the same date. Reversing the supplementary statement on defence policy six months earlier, he added that the government did not plan to maintain a special military capability for use East of Suez after the end of 1971.¹⁷⁶ The F-111 order was cancelled, since there was no longer an operational requirement for long-range strike aircraft.

Summary

Britain's scientific-military-industrial complex was able to rise to the challenge of making the hydrogen bomb in the 1950s but the V-bombers were becoming obsolescent by the 1960s. Development of new British delivery systems was likely to be very expensive and Polaris offered an affordable, stable, second-strike capability. Both the 1957 Defence White Paper and Labour's National Plan identified the high costs of defence and defence-related industries in terms of labour, especially scientific and technical manpower, as burdens that were holding back exports and economic growth, and thereby weakening British power and influence. The problem of keeping up with military technology was particularly difficult for Britain since the cost of research and development could not be spread across production runs on the same scale as in the United States or the Soviet Union. The rational response was to produce a limited range of weapons, and to export these to spread costs

¹⁷⁵ Minutes of meeting in the Foreign Secretary's room, House of Commons, 20 Dec. 1967, PREM 13/1999, TNA.

¹⁷⁶ *Public Expenditure 1968/69 and 1969/70* (Cmnd 3515), PP 1967–68, xxxix. 791, paras. 12–13.

and earn foreign exchange, and to obtain others through imports or by acquiring technology from the United States, or through collaborative projects with other European powers. Britain still had a large scientific-military-industrial complex by Western European standards at the end of the 1960s, and its best products were internationally competitive.

The hydrogen bomb enabled Britain to maintain its position as the United States' major ally. From 1957–8 American resources were harnessed for British ends through the supply of technical know-how and through combined planning by the US Strategic Air Command and Bomber Command. Reliance on the deterrent also held out the prospect in 1957 of smaller defence budgets and of a stable economy. In the event, the balance of payments continued to be weak and sterling vulnerable. Moreover, reductions in the size of conventional forces made the full range of British defence commitments unsustainable. Withdrawal from East of Suez was a rational response to long-term trends and was for the most part conducted in an orderly way that secured Britain's interests. The confrontation with Indonesia had a successful outcome in terms of creating a stable political situation in Malaysia. The same could not be said of South Arabia, where withdrawal in November 1967 involved transfer to a single-party People's Republic of South Yemen that had no interest in continuing Commonwealth links, but Britain did retain good relations with oil-rich states in the Persian Gulf. The priority given to the nuclear deterrent and NATO made sense in terms of Churchill's American and European circles, and the decision to relinquish overseas commitments came at a time when Commonwealth links were weakening for economic and political reasons.

Paul Kennedy is correct in identifying relative economic decline as *one* important reason for loss of military power, but no conceivable rate of economic growth could have matched the 180 per cent rise in the estimated cost of developing TSR-2 between 1960 and 1964. While the TSR-2 was an exceptional example of the escalating costs of weapons systems, it was only one of a number of major projects that had to be cancelled to keep the proportion of national income devoted to defence from rising. Greenwood is correct to argue that British defence budgets were characterised by stability rather than decline, but stability was not enough to maintain the existing pattern of armed forces with the latest equipment. Consequently, as he pointed out, there was a need to reshape strategy.

Conclusion

This book has taken a broader approach to the study of war than conventional military histories, both in studying the interaction of technology, economics and strategy, and in emphasising that war is a single process. Arms cannot be used effectively unless backed by adequate economic resources. Air, land, sea and economic warfare are mutually reinforcing. Seen in this broader perspective, British grand strategy was extraordinarily ambitious and adaptable, involving defence of world-wide interests. When British economic resources were inadequate to sustain its armed forces, the resources of the United States were harnessed for the purpose.

Arms

Edgerton has suggested that the British elite believed that relative strength in science and technology could compensate for lack of economic resources. From his perspective, the chain of causality ran from strategy to technology, with Britain being the first naval power, the first aeronautical power and one of the first nuclear powers.¹ It is possible to argue that the march of science left British policymakers with little choice but to be technically up to date. For example, even naval officers who did not share Fisher's enthusiasm for submarines agreed that the Royal Navy could not neglect them once they had been developed abroad. The Wright brothers hawked their aircraft round the great powers as soon as it had been invented. Nuclear physics was not confined to one nation. From this perspective, expenditure on increasingly expensive research and development, and weapons systems, was inevitable.

The evidence in support of Kaldor's thesis that the services were conservative in their requirements and preferred increasingly complex and expensive versions of existing weapons systems to completely new

¹ Edgerton, 'Liberal militarism', pp. 147–53.

ones is far from overwhelming. It is true that ministers could be more enthusiastic than their service advisers about new technology, as with Churchill's advocacy of tanks in the First World War, or Sandys' policy of replacing manned fighters with guided missiles, but reluctance on the part of soldiers or airmen to get ahead of what technology could deliver can be interpreted as common sense as much as conservatism. There were, of course, conservative minds to be found in the services, but that is true in all professions, and there is plenty of evidence that the British armed forces were at least as willing to innovate as their counterparts in other countries.

In the case of air warfare, Britain had more than matched Germany in strategic bombing by 1918. However, Air Staff enthusiasm ran ahead of technology and Bomber Command had a long learning curve in the Second World War. A little more scepticism might have avoided misallocation of resources, bearing in mind that the opportunity cost of labour and materials embodied in bombers included aircraft for other purposes, such as anti-submarine warfare or tactical air power, or in making equipment for the navy or army. On the other hand, the Air Staff's preference for an offensive strategy did not prevent Britain leading the world in air defence, including command and control systems as well as radar and fighters. The Germans were about two years ahead of the British in the development of jet engines, but the RAF introduced jet fighters in the same year as the *Luftwaffe* (1944) and a year ahead of the Americans. In the post-war period the Air Staff embraced nuclear weapons but the effort to provide delivery systems – the V-bombers and the Blue Streak IRBM – placed a strain on Britain's resources for research and development. The outcome was greater reliance upon American technology, which was seen as a better alternative to obsolescence.

Likewise there is more evidence of technological innovation than of conservatism in the Admiralty. Down to 1914 the Royal Navy led the way in building larger battleships and battle-cruisers, and ordered submarines earlier and in greater numbers than the German navy. Backwardness in mine warfare was the exception, not the rule. Britain pioneered aircraft carriers and was still capable of innovation in the 1950s, as shown by the introduction of the angled deck. Battleships did not remain in service in the Royal Navy any longer than in other navies. In the 1960s the navy was keen to adopt nuclear propulsion for submarines, importing American technology for the purpose, and competently took on the role of the nuclear deterrent.

The British army may not have made as much use of tanks in the First World War as critics like Fuller, Liddell Hart or Travers have claimed

that it should have done, but it was ahead of the French and German armies in introducing tanks to the battlefield. The Royal Artillery adopted scientific techniques that enabled it to outgun the Germans by 1918. The army found it harder than the air force or navy to keep up with its European counterparts because it had to find a balance between technology and tactics appropriate for major wars, on the one hand, and for limited wars, on the other. Consequently there was a good deal of catching up to be done during the Second World War. Nevertheless, the army dealt with its different roles with professionalism. Success in low-level conflicts, particularly the Malayan emergency of 1948–57 and the confrontation with Indonesia in the 1960s, both very different from the European role for which the army also had to train, does not suggest an undue attachment to a ‘baroque arsenal’.

Economics

British grand strategy incorporated economic as well as military strength as a factor in warfare and deterrence. The question of how much of the national income should be spent on defence depended upon international relations as well as economics, and clearly the answer was different in war than in peace. Before 1914 Britain had a stronger balance of payments on current account and larger holdings of overseas assets than any other country. A substantial part of this advantage was used up in the First World War, and Churchill’s policy of victory at any cost in the Second World War turned Britain into the greatest debtor in the world. From an economic point of view, Britain’s decline as a great power can be seen to have been accelerated by Pyrrhic victories. It was only from the late 1930s that the balance of payments and confidence in sterling were significantly affected by the level of defence expenditure in peace-time. Frequent sterling crises, and devaluations in 1949 and 1967, showed that the proportion of national income being spent on defence in the post-war period was clearly at the upper limit of what the balance of payments would bear. Of course, the external balance could have been strengthened if higher taxes had been used to reduce civil consumption and therefore imports, but tax rates at the levels reached in the 1940s and 1950s could hardly have been increased significantly without adverse effects on enterprise and productivity. Alternatively, government might have spent less of its revenue on welfare and more on defence, but it is worth noting that whereas over the 1950s and 1960s Britain spent a higher proportion of national income on defence than any other European NATO power, her expenditure on social security

was a lower proportion of national income than the average for Western European countries.²

Another way to look at whether the level of expenditure on defence was too high is to consider the effects on industry. While mass production of munitions in war-time could be expected to encourage industry to modernise, the effects of peace-time orders for small batches of weapons designed to higher specifications than required for civilian use were probably quite otherwise, especially when there was limited competition between firms and contracts were on a cost-plus basis. Air Ministry research contracts kept aircraft and aero-engine firms at the forefront of technology in the inter-war period, but the attempt in the 1950s to match the United States and the Soviet Union in research and development overstrained the British aircraft industry. Further research is required into the micro-economic effects of defence expenditure. There is no doubt, however, that the intention of the Conservative and Labour governments in reducing the size of the armed forces and the aircraft industry after 1957 was to strengthen the national economy and therefore Britain's position as a great power.

British output of munitions in both world wars was prodigious and some retrenchment after each was inevitable. Nevertheless British arms industries benefited from orders that were as large as could be expected. The output of warships from Britain's shipyards was greater than that from those of the United States until the Second World War or the Soviet Union until the late 1940s, and was still the third largest in the world thereafter. The British aircraft industry was always one of the largest in the world, being only temporarily overtaken by Germany in the 1930s, and was still the largest in Western Europe in the 1960s. Army contracts were not large by international standards, except in war-time, and it is not surprising that the supply of munitions for sudden expansions of the army in 1914 and 1939 was problematic. Even so, the army was not neglected in the scientific-industrial-military complex, as witness Britain's capacity to compete internationally in the manufacture of tanks in the 1950s and 1960s.

Given the tendency of the cost of weapons systems to rise faster than national income, defence policy could not be left to the defence departments alone. The Treasury's attempts to curb the demands of the armed forces, notably during the conscription debate in 1915–16 and in the setting of financial limits that led to the Inskip Report in 1937, the

² See tables 5.6 and 6.5 above and Roger Middleton, *Government versus the Market: The Growth of the Public Sector, Economic Management and British Economic Performance, c.1890–1979* (Cheltenham: Edward Elgar, 1996), p. 98.

Global Strategy paper in 1952 and the Defence White Paper in 1957, were motivated by an understanding that too much defence expenditure would undermine Britain's economic strength. There was a need to match strategic ends and economic means.

Grand strategy

In the long run British strategy had to be adapted to enable smaller, if more powerful, armed forces to protect the United Kingdom, its maritime communications, and overseas territories and interests, and to support allies. However, two world wars, each preceded by an arms race, and rearmament at the time of the Korean War disturbed the long-term trend. Strategists had to deal with short-term dangers that changed over time according to developments in international relations and military technology. Any attempt to impose a rigid model of a British way in warfare on the past is liable to distort understanding. The strategic choices facing an island nation were different from those of continental European powers, but British strategy was influenced more strongly by technical change and economics than by traditional modes of thought. At the same time Edgerton's division of the British way of warfare into naval, air and nuclear phases oversimplifies the interaction between technology and strategy, as he himself points out.³

Sea power was fundamental to British strategy for defensive and offensive reasons. Protection of trade routes enabled Britain to import essential food and raw materials and also to supplement her own output of munitions. In more general economic terms, she could exploit an international division of labour by concentrating her productive resources on making goods in which she had a comparative advantage. Command of the sea also enabled Britain to deny an enemy access to extra-European sources of supply, and to despatch land forces overseas, including Western Europe. Air power added to the hazards facing warships, as was demonstrated repeatedly in the Second World War, but aircraft could be used to add to the striking power of the fleet and to help to protect the merchant navy from submarines. The navy continued to be essential to British strategy in Edgerton's air phase and became the means of delivering the deterrent in the nuclear age.

Although amphibious operations had long been a feature of British warfare, lack of co-operation between the army and navy in the Edwardian period meant that Britain was not well prepared to exploit sea power in this way in the First World War, as was demonstrated at

³ Edgerton, 'Liberal militarism', p. 141.

Gallipoli. Matters were no more advanced by the Norwegian campaign in 1940. However, amphibious operations became a major feature of the Second World War and investment in commando carriers and specialist landing craft after 1957 for the East of Suez role raised British capability for combined operations to new levels of efficiency. Once more there is no clear trend here from a naval to an air or nuclear phase in the British way of warfare.

Britain was a pioneer of air power but the absence of any plausible enemy within range of the United Kingdom from 1919 to 1933 meant the RAF's expenditure did not exceed the army's until 1937/8 or the navy's until 1938/9. Had the allocation of finance recommended by the DRC in 1934 not been changed radically by Neville Chamberlain, Edgerton's air phase would have begun later than it did. Even in the Second World War, strategic bombing was part of a wider strategy of economic warfare, encompassing naval blockade. The impact of bombing on Germany's oil output in 1944 was all the more damaging because the increased scale of land operations after D-Day forced the *Wehrmacht* to use up fuel reserves, while air operations were greatly aided by the overrunning of German radar early warning systems. The RAF was at its most effective when it acted in combination with the other services.

The biggest break in the British way of warfare in the first half of the twentieth century related to the balance between loans or subsidies, and supplies, for allies on the one hand, and the size of the army on the other. In the First World War Britain not only adopted her traditional role of paymaster of the Allied coalition but she also put an army of unprecedented size into the field. The attempt to do both was beyond her economic power, and the role of paymaster had to be ceded to the United States in 1917. The loss of wealth left Britain in no position to be a major source of subsidies if she was also to maintain substantial armed forces of her own again.

Howard, Barnett and Bond have focused criticism on the decision taken at the end of 1937 to give imperial defence priority over the continental commitment. However, despite this priority, no additional RAF squadrons were allocated to imperial defence, and the army's rearmament programme was already subject to delay for industrial reasons. There was a danger that the Chiefs of Staff's long-war strategy would be undermined by rearmament before an outbreak of hostilities, and overriding priority was given to the defence of the United Kingdom and its maritime communications, in line with the strategic principle of securing one's main base. Evidence of neglect of imperial defence, particularly in the Far East, helps to place decision-making in the 1930s in perspective: Britain had too many commitments and policymakers

had to juggle them as best they could. In the event, the fall of France in 1940 forced the British into a maritime strategy for most of the Second World War and even without a continental commitment the British armed forces could be sustained after 1941 only through Lend-Lease.

The nature of all-out war changed with the use of the atomic bomb in 1945 and more particularly with the testing of hydrogen bombs in 1954. Nevertheless there was a case for maintaining balanced conventional forces to prevent limited wars developing into major wars, especially as long as Britain had a greater responsibility than other European countries for commitments outside the NATO area. By the mid-1950s ministers accepted that defence forces had to be reduced to a sustainable level for the long term and believed that the economy should be strengthened to meet the new challenge from the Soviet Union in the form of competitive co-existence. Eden and Macmillan deserve credit for undertaking policy reviews of how Britain should strike a balance between armed preparedness and economic strength. The 1957 Defence White Paper was not a retreat from power but a redeployment of resources for a long-term strategy appropriate to the Cold War. Along with the reduction in overseas commitments represented by the Wilson government's decision to withdraw from East of Suez, the White Paper can also be seen as a response to the problem that the cost of weapons systems tended to grow more rapidly than national income, leading to a reduction in the size of the armed forces, without necessarily increasing their firepower relative to that of potential enemies. Cuts had to be made in commitments by the late 1960s, and the deterrent and the contribution of the BAOR to the political cohesion of NATO were deemed to have higher priority than Britain's world role. Contrary to what Barnett believed, policymakers could tackle inherited overseas commitments with clear-sighted, strategic calculation once the Treasury had pointed out that costs were exceeding benefits.

British strategy between 1904 and 1969 was certainly not beyond criticism. It was overly influenced by bureaucratic politics, with each service pressing its own case for the importance of the contribution that it could make to national security. In particular, the RAF was too concerned to retain its separate identity after 1918 and was unable to support the army or the navy effectively until 1942. Even the Global Strategy paper of 1952, which has its admirers among authorities in strategic studies, can be seen to be an exercise in papering over cracks created by the vested interests of individual services. Attlee was surely right when he said that there was a need for a single defence doctrine to ensure proper combined use of arms. The transfer of responsibility for the nuclear deterrent from the V-bombers to Polaris submarines in 1969

may have helped in this regard, since the RAF henceforth no longer had a separate *raison d'être* from the other services.

Postscript

The pattern in defence policy established at the end of the 1960s remained in place for the remainder of the Cold War. The cost-effectiveness of a submarine-launched, second-strike nuclear deterrent led to the Polaris system being updated in the Chevaline programme in the 1970s and replaced by Trident in the 1980s. British land, air and sea power was concentrated in Europe and the North Atlantic, but greater out-of-NATO area capability was retained than the decision to withdraw from East of Suez might seem to have implied. British warships continued to take part in exercises with allies in the Indian Ocean and the Pacific and, despite the decision in 1966 not to build new aircraft carriers, the 'Invincible'-class 'through-deck cruisers' laid down in the 1970s gave the navy continuing fixed-wing air support with VTOL Harriers. No country other than the two superpowers could have done what the British armed forces accomplished in the Falklands War in 1982, and no other European ally of the United States made so large a contribution to the coalition that drove the Iraqi army from Kuwait in 1991.⁴ The British way of warfare continued to be different from that of a continental European power, and was best performed by adaptable, highly professional, volunteer forces rather than more numerous but less well trained conscripts.

⁴ Geoffrey Till, 'The return to globalism: the Royal Navy east of Suez, 1975–2003', in Kennedy (ed.), *British Naval Strategy*, pp. 244–68; Lawrence Freedman, *The Official History of the Falklands Campaign*, 2 vols. (Abingdon: Routledge, 2005), vol. II: *War and Diplomacy*; Alberto Bin, Richard Hill and Archer Jones, *Desert Storm: A Forgotten War* (Westport, Conn.: Praeger, 1998), pp. 67–8, 79.

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